



USAID
FROM THE AMERICAN PEOPLE



The State of the Sea: Indonesia



Volume One

An Overview of Marine Resource
Management for Small-Scale Fisheries and
Critical Marine Habitats in Indonesia

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Produced by the USAID Sustainable Ecosystems
Advanced (SEA) Project and the Ministry of Marine
Affairs and Fisheries (MMAF), Republic of Indonesia



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This publication was jointly produced by the USAID Sustainable Ecosystems Advanced (SEA) Project and the Ministry of Marine Affairs and Fisheries (MMAF), Republic of Indonesia.

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Front cover photo: typical fishing vessel in eastern Indonesia. Coral Triangle Center / M Welly

Back cover photo: fish catch. Coral Triangle Center / M Korebima

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FOREWORD



As an archipelagic nation, Indonesia hosts exceptionally rich and diverse marine and fishery resources. The oceans are the future of our nation. They are vital for domestic food security and need to be conserved.

The success of Indonesia's concerted efforts to combat Illegal, Unreported and Unregulated (IUU) Fishing have helped restore the fish stocks within the nation's Fisheries Management Areas (FMAs). Indonesia is optimistic to be the center of gravity for world fish production, generating greater economic benefits for the nation. Therefore, it is essential to advance sustainable fisheries management, including an improved management of marine protected areas. We need to embrace the challenge of managing marine and coastal ecosystems, in order to ensure both an excellent supply of fish and healthy world oceans.

I am delighted with the synergy built with USAID through the USAID Sustainable Ecosystems Advanced (SEA) Project, realized through the launching of this 'State of the Sea' publication which is published in three volumes. This publication captures the journey of promoting sustainable fisheries management in Indonesia and details the on-ground efforts being implemented at a number of sites.

I hope that this publication will inspire, educate and serve as a useful source of information. It is also a great avenue for exchanging experiences and building a shared understanding, so that we can work together to nurture the oceans for the future of our nation.

A handwritten signature in black ink, consisting of stylized, flowing letters.

Ir. Nilanto Perbowo, M.Sc.

Secretary General

*Indonesian Ministry of Marine
Affairs and Fisheries (MMAF)*



Oceans cover more than 70 percent of our planet. Globally, more than one billion people depend directly on a healthy marine environment for food, income and water. This dependency is felt nowhere more keenly than in coastal communities around the world.

The U.S. Government, through the United States Agency for International Development (USAID), has supported efforts to advance the sustainable management of marine and coastal areas globally for more than 30 years. For much of this time, USAID has partnered with Indonesia to test and improve marine resource management approaches and techniques. The lessons learned from this partnership have tremendous potential for global replication. For example, our collaboration to bring an end to Illegal, Unreported, and Unregulated fishing through local and national initiatives serves as a model of cooperation that brings mutual benefits in biodiversity conservation and equitable economic development.

This “State of the Sea” review, published in three volumes, describes steps we are taking together to achieve marine sustainability in Indonesia. This publication captures a critical time in the nation’s development as a global maritime leader. By sharing the challenges, opportunities and aspirations of this great nation that encompasses more than 16,000 islands and over 250 million people, the “State of the Sea” is a critical baseline for taking stock of the past and informing future actions toward improved marine resource management.

As the largest archipelagic nation on the planet, Indonesia is a strong leader in marine resource management. Through our partnership, the United States and Indonesia are building a foundation for long-term economic prosperity that will benefit current and future generations and protect Indonesia’s unique marine biodiversity.

USAID is proud to partner with Indonesia to advance our maritime security and sustainability for future generations.

Erin E. McKee

USAID Indonesia Mission Director

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These books represent the composite work of many organizations and individuals.

ABBREVIATIONS & ACRONYMS

AP2HI	<i>Asosiasi Perikanan Pole & Line dan Hand line Indonesia</i> (Association of Pole & Line and Hand line Fisheries Indonesia)	DJ KP3K	<i>Direktorat Jenderal Kelautan, Pesisir dan Pulau-Pulau Kecil</i> (Directorate General of Marine, Coasts and Small Islands)
ADB	Asian Development Bank	DJ PSDKP	<i>Direktorat Jenderal Pengawasan Sumber Daya Kelautan dan Perikanan</i> (Directorate General of Marine and Fisheries Resources Surveillance)
AMDAL	<i>Analisis mengenai dampak lingkungan</i> (Environmental impact analysis)	DKP	<i>Dinas Kelautan dan Perikanan</i> (Provincial Marine and Fishery Agency)
ASEAN	Association of South East Asia Nations	EAFM	Ecosystem-based approach to fisheries management
BAPPENAS	<i>Badan Perencanaan Pembangunan Nasional</i> (National Development Planning Agency)	EEZ	Exclusive economic zone
BKIPM	<i>Badan Karantina Ikan, Pengendalian Mutu dan Keamanan Hasil Perikanan</i> (Agency for Fish Quarantine, Quality Control and Fisheries Products Safety)	E-KKP3K	<i>Pedoman teknis evaluasi efektivitas pengelolaan kawasan konservasi perairan, pesisir dan pulau-pulau kecil</i> (Technical guidelines for evaluating the management effectiveness of aquatic coasts and small island conservation areas)
BRSDM	<i>Badan Riset dan Sumber Daya Manusia</i> (Agency for Research and Human Resources)	ESDRs	Earth system data records
CI	Conservation International	ETP	Endangered, threatened, and protected
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora	FAO	Food and Agriculture Organization
CORAL	Coral Reef Alliance	FIP	Fishery improvement projects
COREMAP	Coral Reef Management and Rehabilitation Program	FMA	Fisheries management area
COTs	Crown-of-thorns	FMC	Fisheries management council
CPUE	Catch per unit effort	GDP	Gross domestic product
CSR	Corporate social responsibility	GSTC	Global Sustainable Tourism Council
CTC	Coral Triangle Center	GT	Gross tons
CTI-CFF	Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security	IDR	Indonesian Rupiah
DAFF	Department of Agriculture, Fisheries and Forestry	IEN	Indonesia Ecotourism Network
DESA	Department of Economic and Social Affairs	ILMMA	Indonesia Locally-Managed Marine Area Network
DFW	Destructive Fishing Watch	IMACS	Indonesia Marine and Climate Support Project
DG	Directorate General	ITF	Indonesian Throughflow
DJ	<i>Direktorat Jenderal</i> (Directorate General)	IUCN	International Union for Conservation of Nature
DJ KKJI	<i>Direktorat Jenderal Konservasi Kawasan dan Jenis Ikan</i> (Directorate General of Area Conservation and Fish Species)	IUU	Illegal, unreported, and unregulated
		IWP	Indonesian waste platform
		KepMen	<i>Keputusan Menteri</i> (Ministerial decree)

ABBREVIATIONS & ACRONYMS

KepPres	<i>Keputusan Presiden</i> (Presidential decree)	PELNI	<i>Pelayaran Nasional Indonesia</i> (National shipping company)
KKP	<i>Kementerian Kelautan dan Perikanan</i> (Ministry of Marine Affairs and Fisheries)	PerDa	<i>Peraturan Daerah</i> (Local regulation)
KLHS	<i>Kajian lingkungan hidup strategis</i> (Strategic environmental assessment)	PerDirjen	<i>Peraturan Direktur Jenderal</i> (Regulation of the Director General)
LIPI	<i>Lembaga Ilmu Pengetahuan Indonesia</i> (Indonesian Institute of Sciences)	PerMen	<i>Peraturan Menteri</i> (Ministerial regulation)
LSK	<i>Lembaga Sertifikasi Kompetensi</i> (Institution for Competence Certification)	PerPres	<i>Peraturan Presiden</i> (Presidential regulation)
MDPI	<i>Yayasan Masyarakat dan Perikanan Indonesia</i> (Indonesian Society and Fisheries Foundation)	PES	Payments for ecosystem services
MEF	Ministry of Environment and Forestry	<i>Pokmaswas</i>	<i>Kelompok masyarakat pengawas</i> (Community surveillance group)
MITP	Marine Tourism Improvement Program	PRL	<i>Pengelolaan ruang laut</i> (Marine spatial management)
MMAF	Ministry of Marine Affairs and Fisheries	PSDKP	<i>Pengawasan Sumber Daya Kelautan dan Perikanan</i> (Marine and Fisheries Resources Surveillance)
MPA	Marine protected area	PSM	Port state measures
MPWH RI	Ministry of Public Works and Housing of the Republic of Indonesia	PT	<i>Perikanan Tangkap</i> (Capture Fisheries)
MSP	Marine spatial planning	PUSDATIN	<i>Pusat Data dan Informasi</i> (Data and Information Center)
NASA	National Aeronautics and Space Administration	RPP	<i>Rencana pengelolaan perikanan</i> (Fisheries management plan)
NGO	Non-governmental organization	RTRWP	<i>Rencana tata ruang wilayah provinsi</i> (Provincial spatial plan)
nm	Nautical miles	RZWP-3-K	<i>Rencana zonasi wilayah pesisir dan pulau-pulau kecil</i> (Marine spatial planning for coastal and small islands)
NOAA	National Oceanic and Atmospheric Administration	SEA	Sustainable Ecosystem Advanced
NPoA	National Plan of Action	SecGen	Secretary General
NSPK	<i>Norma, standar, prosedur dan kriteria</i> (Norms, standards, procedures, and criteria)	<i>Sismaswas</i>	<i>Sistem masyarakat mengawas</i> (Community surveillance system)
NTZ	No-take zone	SK	<i>Surat keputusan</i> (Decision statement)
OECD	Organisation for Economic Co-operation and Development	SK3	<i>Standar kompetensi kerja khusus</i> (Special work competency standard)
P3D	<i>Personil, Peralatan, Pembiayaan dan Dokumen</i> (Personnel, Financing, Infrastructure, and Documentation)	SKKNI	<i>Standar kompetensi kerja nasional Indonesia</i> (National work competency standards)
PDSPKP	<i>Penguatan Daya Saing Produk Kelautan dan Perikanan</i> (Strengthening the Competitiveness of Marine and Fishery Products)	SOP	Standard operating procedure
		SOTS	State of the Sea
		SPAG	Spawning aggregation
		SSF	Small-scale fisheries

SSIC	Sustainable Solutions International Consulting
STITEK	<i>Sekolah Tinggi Teknologi Kelautan</i> (School for Marine Technology)
STP	<i>Sekolah Tinggi Perikanan</i> (School for Fisheries)
TEV	Total economic value
TNC	The Nature Conservancy
TUFs	Tourism user fees
UK	<i>Unit kompetensi</i> (Competency units)
UKIP	<i>Universitas Kristen Papua</i> (Christian University of Papua)
UKL	<i>Upaya Pengelolaan Lingkungan Hidup</i> (Environmental management measures)
UNIPA	<i>Universitas Negeri Papua</i> (University of Papua)
UNODC	United Nations Office on Drugs and Crime
UPL	<i>Upaya pemantauan lingkungan hidup</i> (Environmental monitoring measures)
UPT	<i>Unit Pelaksanaan Teknis</i> (Technical implementing unit)
USAID	United States Agency for International Development
USD	United States Dollar
USG	United States Government
UU	<i>Undang-Undang</i> (Act)
VIIRS	Visible infrared imaging radiometer suite
VMS	Vessel monitoring systems
WCS	Wildlife Conservation Society
WCU	Wildlife Crime Unit
WWF	World Wildlife Fund

ABOUT THE USAID SUSTAINABLE ECOSYSTEMS ADVANCED (SEA) PROJECT

On March 21, 2016, Tetra Tech was awarded the USAID SEA Project by the USAID Indonesia Mission. This is a five-year initiative that supports the Government of Indonesia to improve the governance of fisheries and marine resources and to conserve biological diversity at local, district, provincial, and national levels. The USAID SEA Project is focusing its interventions in the North Maluku, Maluku, and West Papua provinces, located in fisheries management area (FMA) number 715.

The objectives of the USAID SEA Project are to:

- support enhanced conservation and sustainable use of marine resources by reforming fishery management and promoting marine protected areas (MPAs) to enhance fishery productivity, food security, and sustainable livelihoods within the target areas
- support and strengthen the leadership role and capacity of the MMAF and local governments to promote conservation and sustainable fishing.

At the end of five years, USAID assistance through the USAID SEA Project will have improved the conservation and management of Indonesia’s marine biodiversity through increased capacity and the application of marine conservation and sustainable fisheries management.

The high-level results that must be achieved by the completion of the project are as follows:

- at least six million hectares in the targeted FMA are under improved fisheries management as a result of United States Government (USG) assistance
- at least six policies, laws, regulations, and/or operational protocols in support of marine conservation and sustainable fishery management created, strengthened, promulgated, and/or enforced at all levels
- key drivers and highest-rated pressures to marine biodiversity show a declining trend in the target areas.

The technical approaches of the USAID SEA Project fall under four key categories, supported by wider strategic approaches, each with associated indicators of success.

Implementing an Ecosystem Approach to Fisheries Management	Establishing and Effectively Managing Marine Protected Areas	Supporting Marine Spatial Planning for Sustainable Management	Promoting Law Enforcement
Improving ecosystem management (# hectares showing improved biophysical condition; # fishing vessels registered; % change in CPUE; % change in reef fish biomass)			
Creating Demand Through Awareness Raising and Advocacy (# people demonstrating changed behavior)	Increasing Incentives for Marine Stewardship (# people with increased economic benefits, secure tenure or managed access; amount of investment leveraged)	Advancing the Development of Marine and Fisheries Policies & Regulations (# of laws, policies, strategies, plans or regulations proposed or adopted)	Institutionalizing Training & Capacity Building (# people trained and applying improved law enforcement practices; # innovations supported)

The USAID SEA Project is implemented through the MMAF, with technical support from Tetra Tech and funding from USAID Indonesia.

ABOUT THE STATE OF THE SEA (SOTS) PUBLICATION

The **Ministry of Marine Affairs and Fisheries (MMAF)** of the Republic of Indonesia was established in 1999. The vision of MMAF is to achieve competitive and sustainable development of fisheries and marine resources for the welfare of the community. To realize this vision, the ministry's mission is to: (1) optimize the utilization of marine resources and fisheries; (2) increase the value and competitiveness of marine and fishery products; and (3) maintain the carrying capacity and environmental quality of marine resources and fisheries (www.kkp.go.id).

The **United States Agency for International Development (USAID)** is a federal agency that manages U.S. foreign assistance throughout the world to help developing countries improve their economic and social conditions. USAID is the lead USG agency that works to end extreme global poverty and enable resilient, democratic societies to realize their potential. Through targeted investment and by harnessing the power of science, technology, and innovation, USAID works with the government of Indonesia, local leaders, academia, the private sector, civil society, and partners to address development challenges, from forging a just and accountable democracy to meeting the needs of the most vulnerable Indonesians (www.usaid.gov).

Tetra Tech is a leading provider of consulting, engineering, and technical services worldwide. In the field of international development, Tetra Tech aims to create practical, sustainable, and environmentally responsible solutions to address the world's most complex challenges. Its service areas include agriculture and economic growth; democracy and governance; energy; environment and natural resources; land tenure and property rights; water supply and sanitation; architecture, engineering, and construction services; and global security. The firm has provided services to support sustainable development throughout Asia for more than 20 years and more than 50 years globally.

Through the work of the USAID SEA Project, a wide range of existing information (secondary data) has been collated, and new information (primary data) about the region, its marine and coastal issues and opportunities has been generated. Drawing on this information, the SOTS publication aims to provide an accessible, reader-friendly overview of Indonesia's marine and coastal status; it focuses in particular on eastern areas and presents the people, the places, threats being addressed, and plans for the future.

This publication is intended for a wide readership, including marine and coastal management and fisheries practitioners (nationally and internationally) as well as government agencies, donors, and associated marine-related organizations.

The SOTS is presented in three volumes:

VOLUME ONE – introduces the reader to the marine and coastal environment of Indonesia, its biodiversity, use values, and the threats it faces. It provides an overview of the governance and institutional frameworks for marine and coastal management as well as the various management actions being implemented across the country.

This volume can be viewed in conjunction with the remaining volumes, that provide technical insights into some of the key management efforts implemented, or it may be viewed as a standalone, thorough introduction to the state of the sea.

VOLUME TWO – focuses on eastern Indonesia, particularly fisheries management area number 715. It provides a more detailed technical introduction to the range of management efforts currently being implemented across the region.

VOLUME THREE – takes the reader on a journey through fisheries management area number 715. Here the reader discovers the people, the places, and the hands-on impacts of the work being implemented.

These volumes will also provide a framework for assessing the progress of the USAID SEA Project over time, complementing the monitoring and evaluation work undertaken within the initiative.

IMPLEMENTING PARTNERS & SUB-CONTRACTORS

Asosiasi Perikanan Pole & Line dan Handline Indonesia (AP2HI) is the Indonesian Pole & Line and Handline Fisheries Association. AP2HI supports the long-term implementation of sustainability principles for the pole and line and hand line industries and small-scale fisherman in coastal areas of Indonesia. The association was officially inaugurated by the Director General for Capture Fisheries at the Third International Coastal Tuna Business Forum held in Jakarta in 2014. It aims to unite the aspirations of its members and provide guidance on local and international sustainable tuna fishery issues. AP2HI membership ranges across the entire tuna industry. AP2HI is involved in a range of fisheries improvement projects with various parties and has supported government and local agencies to improve access strategies and certification (www.ap2hi.org).

Conservation International (CI) has been working since 1987 to improve human well-being by caring for nature. CI works to ensure a healthy, productive planet for everyone, because people need nature to thrive. Building upon a strong foundation of science, partnership, and field demonstration, CI empowers societies to act responsibly and sustainably for nature, global biodiversity, and, ultimately, for the well-being of humanity. CI has been working in Indonesia since 1991, supporting conservation efforts to achieve sustainable development goals for the lasting benefit of local people (www.conservation.org).

The Coral Triangle Center (CTC) is a local foundation based in Bali with regional scope and global impact. CTC provides capacity building for sustainable fisheries and works to ensure that MPAs within the Coral Triangle are managed effectively, supporting on-the-ground programs through its learning sites in Nusa Penida and the Banda Islands. CTC leads regional learning networks and is a certified training center of the government of Indonesia. CTC works with communities, businesses, governments, and partners to shape lasting solutions to protect coral reef ecosystems and ensure sustainable livelihoods and food security (www.coraltrianglecenter.org).

Indonesia Locally-Managed Marine Area (ILMMA) Network is part of the international LMMA Network that operates in nine countries across the Indo-Pacific. ILMMA was established in 2002 and is focused on eastern Indonesia. To date, ILMMA collaborates with 200 communities to set up their locally managed marine areas (LMMAs) through traditional sasi practices. ILMMA's goal is to assist coastal villages in Papua and Maluku to successfully establish and manage LMMAs, expand the number of independent and sustainable locally-managed marine areas, build a more effective LMMA network, and ensure that marine ecosystems and fisheries are healthy and provide food security for local communities (www.lmmanetwork.org).

Marine Change (PT Konsultasi Investasi Kelautan) is a specialist advisory group founded in 2014. Its vision is to see disciplined long-term investment in innovative efforts to renew fishery and marine ecosystems, permitting them to recover from over-exploitation; ultimately, these efforts will lead to increased prosperity, food security, and secure livelihoods. Marine Change identifies interventions and investment opportunities that lead to improved supply chain efficiency, more sustainable products, and better financial, environmental, and social performance, with increased benefits to coastal communities and seafood companies alike (www.marinechange.com).

The Nature Conservancy (TNC) was established in 1951 and is a well-known organization that works for nature conservation in 72 countries, with a mission to conserve the lands and waters upon which all life depends. In Indonesia, TNC is affiliated with TNC Indonesia, and has supported the conservation of more than 3.9 million hectares (ha) of forest and 5.5 million ha of marine areas in its 26 years in the country. TNC Indonesia aims to ensure future generations inherit a sustainable natural environment (www.nature.or.id).



Rare works through behavior adoption campaigns, known as Pride Campaigns. Rare aims to inspire change to help nature and people thrive. Rare's biggest program is 'Fish Forever'. It encourages fishers to comply with zoning plans and sustainable fishery interventions in exchange for exclusive fishing rights (Territorial Use Rights for Fishing, or TURFs). This strengthens marine tenure, improves fishery sustainability, strengthens communities' organizing capacity, and improves governance of marine resources. Rare's programs improve fisheries, promote more resilient communities, and improve livelihoods and food security. Indonesia is one of five countries selected for implementing Fish Forever (www.rare.org).

Reef Check Foundation Indonesia (RCFI) is part of part of Reef Check International, the largest coral conservation network in the world, spanning over 90 countries. The organization is dedicated to empowering people to improve coastal community welfare through integrated coastal and marine ecosystem management based around three pillars: (1) collaborative management, (2) education–awareness, and (3) science–technology. Reef Check was formed in 1997 as a result of a conservation initiative, through which volunteers were actively involved in monitoring Indonesia's coral reefs. RCFI was founded in 2005 (www.reefcheck.or.id).

Universitas Kristen Papua (UKIP) is a private university established in 2004 and located in Sorong. UKIP has 10 study programs, including fisheries, and 2,000 students. Its vision is to become a center of excellence for higher education in Papua (www.ukip.ac.id).

Universitas Negeri Papua (UNIPA) was established based on Presidential Decree no. 153/2000 and developed by the Faculty of Agriculture, Cenderawasih University. UNIPA has three main tasks: educating, conducting research, and supporting the betterment of society. The university has three campuses, the main one located in Manokwari and the others in Sorong and Raja Ampat. UNIPA has 12 faculties, one of which is the Faculty of Fisheries and Marine Science (www.unipa.ac.id).

The Wildlife Conservation Society (WCS) has worked in Indonesia since the 1960s; in 1995, it opened a country program under a memorandum of understanding with the Ministry of Environment and Forestry. WCS has operated projects in Sumatra, Java, Sulawesi, Nusa Tenggara, and Maluku. In recent years, it has become one of the leading actors in wildlife species conservation and the fight against wildlife crime (www.wcs.org).

World Wildlife Fund – Indonesia (WWF–I) is an independent national conservation organization established in 1962 and member of the WWF global network. Today, WWF–I has 500 staff and works in 28 field areas in 17 provinces, from Aceh to Papua, in collaboration with government, local communities, the private sector, local Non-Governmental Organizations (NGOs) and the general public (www.wwf.or.id).

Yayasan Masyarakat dan Perikanan Indonesia (MDPI) was founded in July 2013 as an independent foundation to promote responsible, sustainable fisheries and the conservation of fishery ecosystems in Indonesia and across the region. These efforts are specifically focused on small-scale, artisanal fisheries. In addition, MDPI supports the development of fishing communities and related supply chains through programs focusing on economic improvements and social stability; the foundation works closely with industries within the supply chains of various seafood products (www.mdpi.or.id).



**Yayasan
Masyarakat dan Perikanan
Indonesia**



The State of the Sea: Indonesia

Volume One

An Overview of Marine
Resource Management
for Small-Scale Fisheries
and Critical Marine
Habitats in Indonesia



INTRODUCING INDONESIA

Indonesia is the world's largest archipelagic nation, composed of 16,056 islands (Hananto, 2017). It has a coastline that stretches for more than 95,180 km, the second-largest coastline in the world after Canada (COREMAP, 2013).

Situated between the Pacific and Indian Oceans, Indonesia has five main islands: Sumatra, Java, Kalimantan, Sulawesi, and Papua. Two of these islands are shared with neighboring nations: Kalimantan is part of the island of Borneo (shared with Malaysia and Brunei) and Papua is part of the island of New Guinea (shared with Papua New Guinea). In addition to this, the smaller Timor island is shared with the separate nation state of Timor-Leste.

●
Left: children from many coastal communities engage in fishing from a young age
Below: a typical coastal settlement in Indonesia



T. SCHULTZ

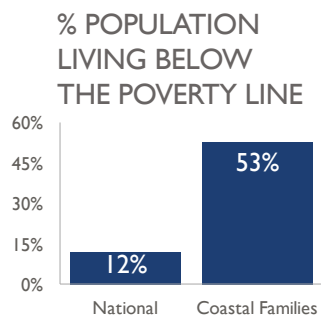
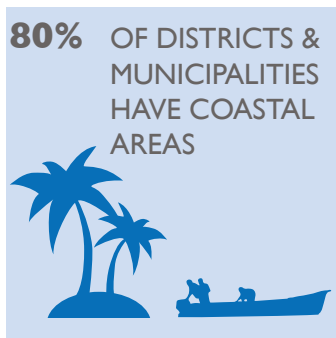
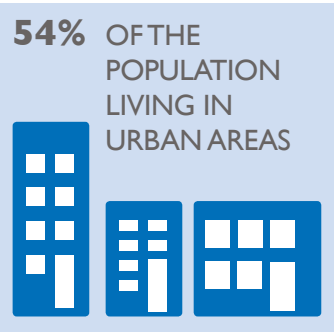
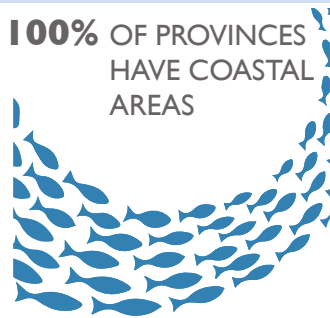
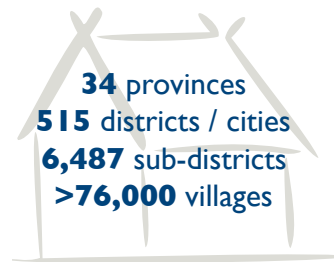
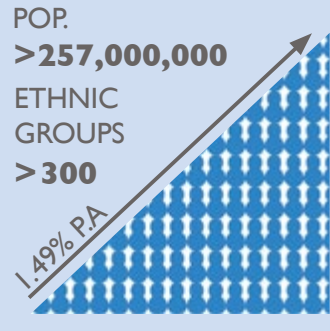


There are over 300 ethnic groups in Indonesia, making up a population of more than 257 million people (DESA, 2015). The capital city is Jakarta, located on Java Island.

Indonesia is located on the equator, in a region known as the Coral Triangle. This area is recognized as the **global center of marine biodiversity**, incorporating all or parts of six nations – Indonesia, Malaysia, Papua New Guinea, the Philippines, Solomon Islands, and Timor-Leste.

Indonesia is at the heart of this exceptionally biodiverse area.

THE POPULATION OF INDONESIA



Sources: ADB, 2012b; ADB, 2012c; Central Bureau of Statistics of Indonesia, 2012; UNDESAPD, 2015; World Bank, 2012. Produced by SSIC.

THE CORAL TRIANGLE





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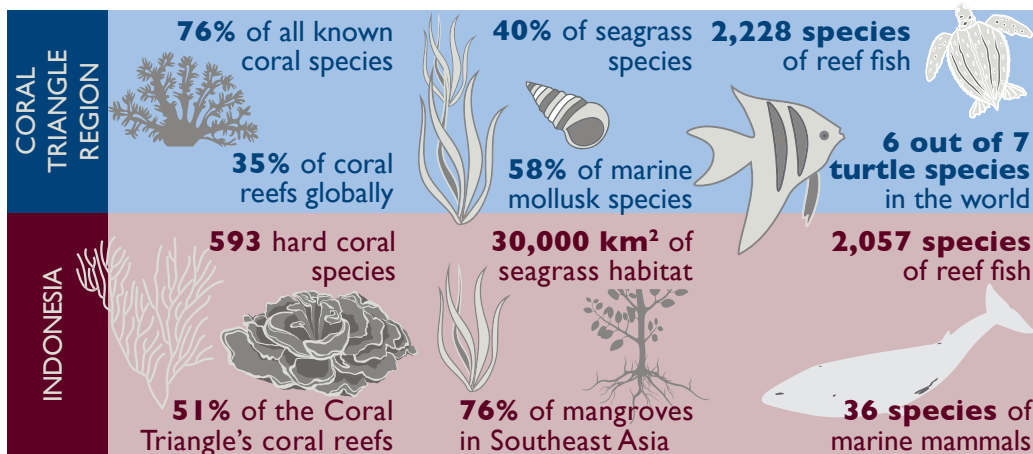
The area's rich marine resources have made the country the **second-largest fish producer in the world**, providing marine food products for both the international and the domestic market. Within Indonesia, fishery products are estimated to provide 54 percent of all animal protein consumed in people's diets, making the nation **one of the highest fishery resource-dependent nations in the world** (ADB, 2014).



Left: fisherwoman selling fish at a domestic market

Over page: vibrant coral reef in the Coral Triangle

INDONESIA: THE HEART OF THE CORAL TRIANGLE



Sources: ADB, 2014; Allen and Adrim, 2003; Bakosurtanal, 2009; Burke *et al.*, 2012; Glover and Earle, 2012; Madeja, 2017; Veron, 2002. Produced by SSIC.



CHAPTER I

THE MARINE & COASTAL ENVIRONMENT OF INDONESIA





Indonesia is host to the highest marine habitat diversity in the world.

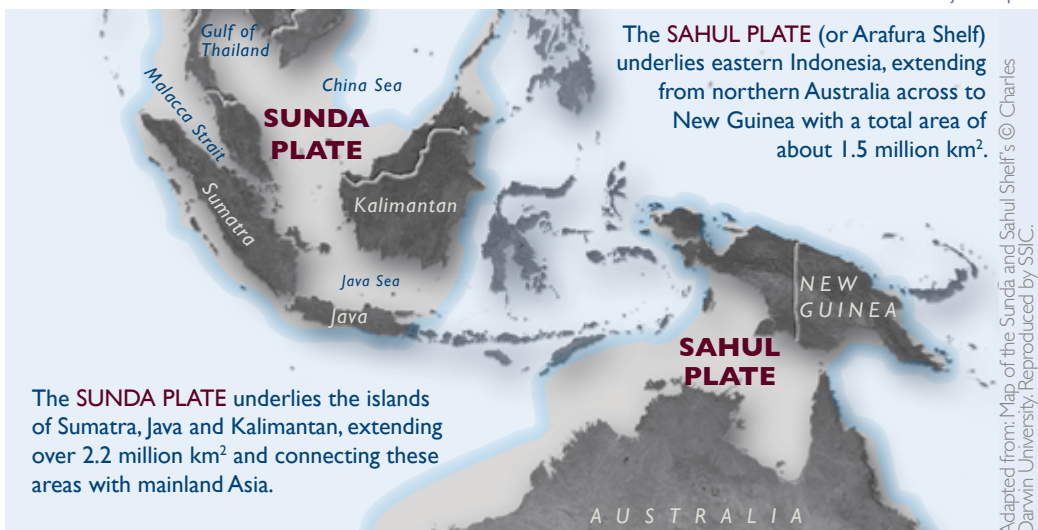
THE PHYSICAL ENVIRONMENT

The Indonesian archipelago bridges two continents, Asia and Australasia / Oceania. The archipelago spans two key tectonic plates – the **Sunda** and **Sahul**.

Sea depths across the region average only 200 meters or less. However, between these two shelves lie deep sea basins, trenches, and submarine volcanoes. One of the earliest explorations of the complex basin system was the Snellius Expedition (1929–1930), led by Dutch colonial authorities. This revealed a total of 27 deep basins and trenches, with extremely deep seas found in the Banda region (7,440 m) and the Celebes Basin in Sulawesi (6,220 m) (ADB, 2014).

The shallow areas that border these deep underwater depressions (known as sill depths) play an important role in localized water circulation, drawing cooler water from the depths to the surface. This diverse underwater topography, combined with the position of Indonesia at the crossroads of the Pacific and Indian Oceans, makes the region one of the primary drivers for the entire global ocean circulation system (Qu *et al.*, 2005).

Left: coastal environment in Raja Ampat

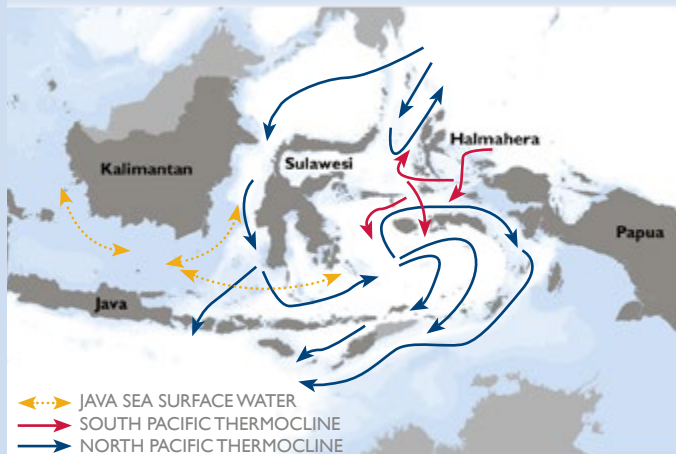


THE INDONESIAN THROUGH-FLOW & ITS ROLE IN THE GREAT OCEAN CONVEYOR BELT

The Indonesian Throughflow (ITF) is a complicated ocean circulation pattern that transports huge volumes of water through the archipelago. A major driver of the ITF is the difference in seawater levels between the Pacific and Indian Oceans, that connect through Indonesia. The Pacific Ocean northeast of the archipelago is above average sea level, and the Indian Ocean to the southwest is below average, resulting in seawater pulling westward (Gordon *et al.*, 2010). In some areas with narrow or shallow straits, this results in seawater being funneled at great volume and speed, creating the notorious and treacherous currents that the region is known for.

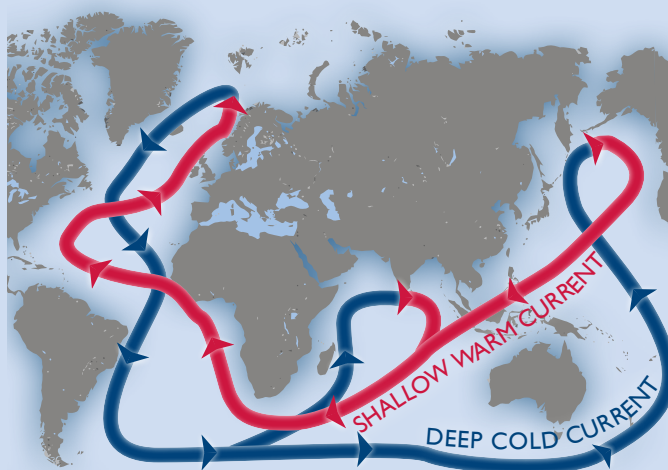
The ITF is so powerful that it is measured in Sverdrups (one Sverdrup equals one million cubic meters of water per second) and is estimated to flow at around 15 Sverdrup (or 15 million cubic meters per second). The ITF is also the only place in the world where warm equatorial surface waters flow from one ocean to another, making it a key driver for the great ocean conveyor belt. This in turn transports and redistributes warm surface waters and deep cooler waters around the world, regulating climate globally (Schneider, 1998; Qu *et al.*, 2005).

INDONESIAN THROUGHFLOW



Adapted from: Sprintall *et al.*, 2009. Reproduced by SSIC.

GREAT OCEAN CONVEYOR BELT



Source: ELC, 2015. Reproduced by SSIC.



DEPOSITPHOTOS.COM

The Indonesian archipelago is almost entirely tropical in climate, with the temperature in coastal plains averaging 28°C. The area's relative humidity ranges between 62 and 81 percent.

In general, there is a dry season (June to October) and a rainy season (November to March). Local wind patterns, however, can greatly affect these general rain patterns. Rainfall across the archipelago varies from an average of more than 200 cm/year (in Western Sumatra, Java, Bali, the interiors of Kalimantan, Sulawesi, and Papua) to less than 100 cm/year (in Nusa Tenggara and the eastern tip of Java) (Climate-Data, 2016).

This rainfall can affect the salinity of the oceans, and both rain and wind patterns can affect their temperature. Sea temperatures tend to be warmer downwind, as warmer surface waters are pushed along, and cooler upwind, as cooler water is drawn up from the oceans depths to replace the surface waters being pushed away by the wind (Qu *et al.*, 2005). Tidal patterns further exacerbate fluctuations in seawater temperature, with Indonesia having one of the most complex tidal systems in the world. These tides, when interacting with the complex topography of the region, create a mixing and oscillating effect in oceanic temperatures and currents (Robertson and Field, 2005). Studies have shown that the largest seasonal natural variation in sea surface temperature occurs in the Timor, Arafura, Banda, and the South China Seas, where temperatures can vary by as much as 4°C.

The extraordinary geophysical conditions of Indonesia have distinctly shaped the marine environment, its fisheries, and resources across the region, making it one of the richest, most diverse marine ecosystems in the world.



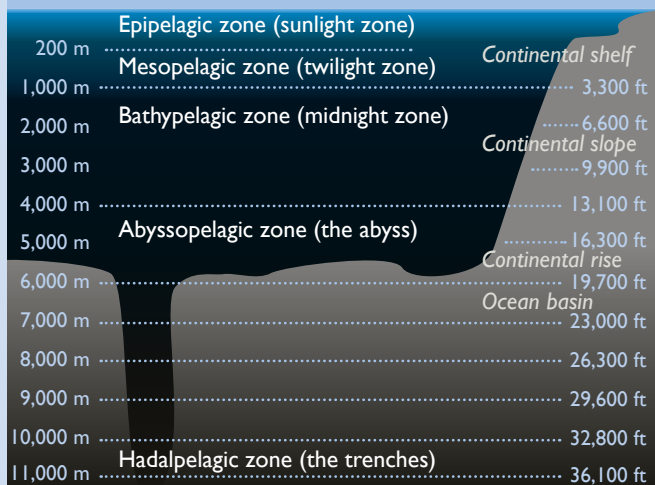
Above: tropical rainstorm in Indonesia

MARINE ZONES

Areas of the ocean are defined by depth zones and include:

- **The epipelagic zone** — Sunlight can still reach this depth; therefore, photosynthesis is possible. A range of marine plants and animal life can be found here.
- **The mesopelagic zone** — Low levels of sunlight still permeate, but not sufficiently for photosynthesis to occur. Animals living here, such as the lantern fish, have developed special adaptations for low light conditions.
- **The bathypelagic zone** — No sunlight reaches here. Life consists of specialized species, such as the angler fish and giant squid. Whales may also dive this deep for prey.
- **The abyssopelagic zone** — Here, the temperature is close to freezing and the pressure is immense. Few animals live in this zone, and many of those that do have bioluminescence for hunting or defense.
- **The hadalpelagic zone** — The deepest zone of all, generally found in deep-sea trenches. Animals here are generally scavenger species surviving on the remains of other organisms fallen to the ocean floor. In some areas, hydrothermal vents at this depth create an entirely unique ecosystem.

MARINE ZONES



Adapted from: Sea and Sky, 2016. Reproduced by SSC.

Below: different marine species live in different layers of the ocean



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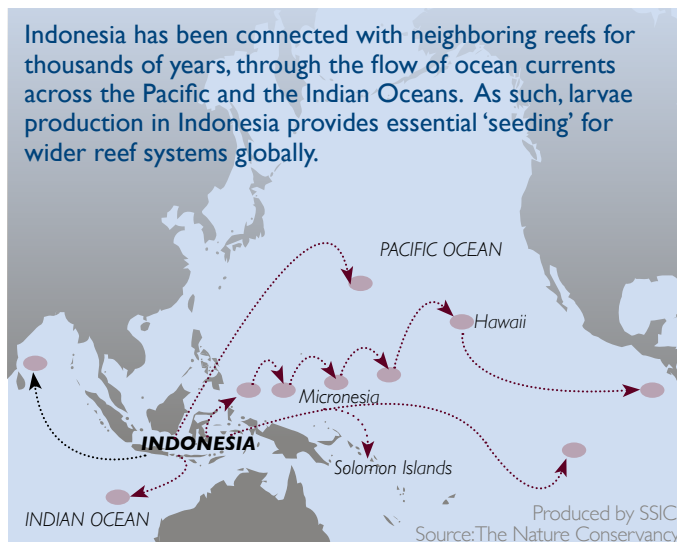
Y PANGASTUTI

MARINE & COASTAL HABITATS

Indonesia is host to the **highest marine habitat diversity** in the world, with the most critical habitats categorized as follows:

CORAL REEFS

Coral reefs are living communities of animals. Individual colonies of hard corals form an exoskeleton that gives reefs their hardened, colorful, rock-like appearance. But these animals are far from static. At night, the individual polyps feed, and the animals regularly spawn larvae into the seas to colonize other areas.



Indonesia is host to the largest area of corals in Southeast Asia, with an estimated 39,500 km² of reefs, accounting for 16 percent of the world's coral habitat (Burke *et al.*, 2012). As such, Indonesia is a key producer of coral larvae, which travel to populate other regions throughout the world.



Above: coral polyps feeding, eastern Indonesia



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All types of reef can be found in Indonesia:

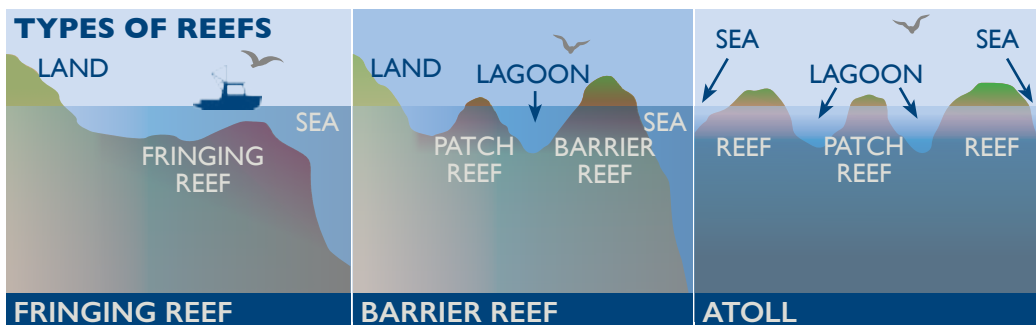
- fringing reefs, which grow near the coastline and are separated from the shore by narrow, shallow lagoons
- barrier reefs, which are separated from the shore by deeper, wider lagoons, running parallel to the coastline
- atolls, rings of coral usually located at sea and formed when islands surrounded by fringing reefs sink into the sea or the sea level rises around them
- patch reefs, small, isolated reefs that often occur between fringing reefs and barrier reefs.



Above: patch reef in eastern Indonesia

Right: gorgonian coral fan, in Misool, Raja Ampat

Though reefs cover less than one percent of the surface area of the world's oceans, they are vital as fishery nurseries, providing critical breeding habitat for 25 percent of all marine fish. As such, **coral reefs are the engines of tropical marine biodiversity.**



- develop along shores of tropical/subtropical islands or continental landmasses
- most affected by human activities because of their proximity to land
- separated from the landmass and fringing reef by lagoons or deepwater channels
- patch reefs can occur within lagoons associated with atolls and barrier reefs
- usually elliptical, arise out of deep water and have a centrally-located lagoon

Adapted from: Karleskint *et al.*, 2009.
Reproduced by SSIC.



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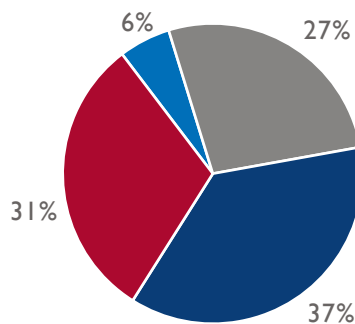
From flamboyant coral fans to spiraling whips, from fields of foliose to lumbering Porites, the diversity of corals in Indonesia is extraordinary, with 593 different hard coral species represented (COREMAP, 2013). The nation's extensive reef habitats are particularly concentrated in the east of the country, harboring an estimated 75 percent of all known coral species.

However, it is also an ecosystem that is facing considerable anthropogenic threats, and it is highly vulnerable to human disturbance over time (Hopley, 1999).

CORAL REEF CONDITION IN INDONESIA

Condition of live hard coral cover
n = 1,076

- Excellent
- Good
- Fair
- Poor

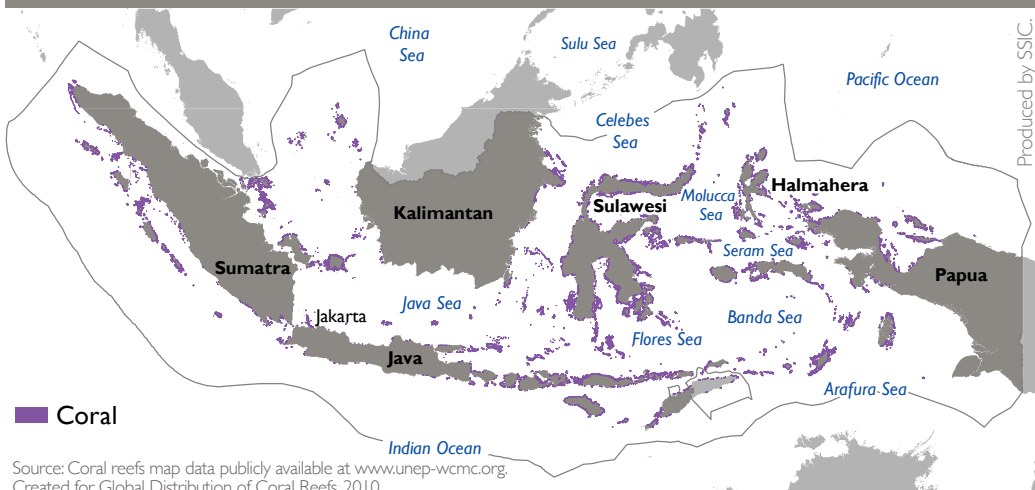


Percentage live hard coral cover categories:
Excellent = 75–100%, Good = 50–74%,
Fair = 25–49%, Poor = 0–24%

Source: COREMAP, 2011

By the early 21st century, studies revealed that only a third of Indonesia's coral reefs could still be considered in 'good to excellent condition' (defined as having more than 50 percent live hard coral coverage), with the remainder suffering various levels of degradation.

CORAL REEF DISTRIBUTION IN INDONESIA



Source: Coral reefs map data publicly available at www.unep-wcmc.org. Created for Global Distribution of Coral Reefs, 2010.

SEAGRASS

Seagrass habitats are a critical part of coral reef ecosystems. They serve as fishery nurseries and feeding grounds for a range of species. They also help trap sediment run-off from the land, stabilizing coastlines, whilst also avoiding sediment traveling further into the marine environment and damaging coral reefs.

Seagrass is the primary diet of dugong and turtle species; in Southeast Asia, it is thought to provide habitat to more than 600 species of fish at some point during their life (McKenzie and Yoshida, 2015). In Indonesia, this critical habitat also supports approximately 85 crustacean species and other marine species, including seahorses (ADB, 2014).

Limited studies suggest Indonesia is host to 13 species of seagrass, covering approximately 30,000 km² throughout the archipelago (ADB, 2014).

Seagrass beds are often gleaned by local communities for seashells, shrimps, crabs, and other invertebrates at low tide. Some seagrasses are also used as raw material for handicrafts, such as baskets, and as material for bedding (ADB, 2014).

However, studies have suggested that there has been an alarming loss of this important marine ecosystem in recent decades (McKenzie and Yoshida, 2015), with the habitat facing a range of human-induced threats.



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● see chapter three for more information on human-induced threats to marine habitats

● Above: seagrass habitat in eastern Indonesia
Right: mangrove forest in West Papua





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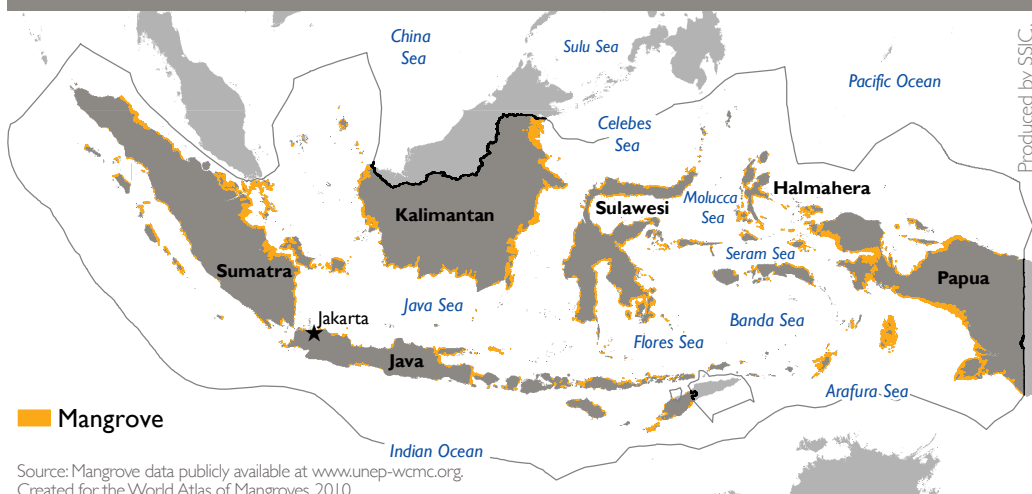
MANGROVES

Indonesia's mangrove forests account for 23 percent of the world's mangrove ecosystems (Giri *et al.*, 2011) and 76 percent of all mangrove areas in Southeast Asia (Bakosurtanal, 2009). The semi-submerged roots of mangrove trees provide an important habitat for breeding and juvenile fish, and, like seagrass, mangroves help to trap sediment from the land, preventing it from entering the marine environment and damaging coral reefs.

Mangroves also provide essential coastal protection services, protecting coastlines from storm surges and other strong wave conditions that could otherwise cause erosion and damage to properties and livelihoods.

Indonesia's mangroves are also among the most carbon-rich forests in the world, containing more than three times as much mean carbon per hectare as land-based tropical forests (Donato *et al.*, 2011) and more than five times as much as upland tropical forests (Murdiyarso *et al.*, 2015).

MANGROVE DISTRIBUTION IN INDONESIA



Covering an area of approximately 3.25 million ha (though estimates vary), more than 50 percent of Indonesia's mangroves are in West Papua, with the remaining mangroves found mostly along the coastlines of Sumatra and Kalimantan (Bakosurtanal, 2009).

At least 18 genera of mangroves with 101 species have been identified in Indonesia, in a range of forms, including mangrove trees (47 species), shrubs (5), herbs and grasses (9), liana (9), epiphytes (29), and parasites (2) (ADB, 2014).

Like coral reefs, mangroves in Indonesia are under threat and are experiencing the fastest rate of mangrove destruction in the world (Campbell and Brown, 2015), with studies suggesting that up to 40 percent of the nation's mangroves have been lost over the past three decades (FAO, 2007). Mangrove deforestation is estimated to account for approximately six percent of Indonesia's total forest loss (Murdiyarso *et al.*, 2015).



COMMONS



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MARINE WILDLIFE

The vast majority of marine wildlife in Indonesia is found in the epipelagic zone, in the three habitats described in the previous section. This includes an estimated 2,057 coral reef fish species, equal to 37 percent of the world's known reef species and 56 percent of all known reef fish in the Indo-Pacific region (Allen and Adrim, 2003; Green *et al.*, 2008b).

Indonesia is also home to six out of the seven known marine turtle species in the world, providing important nesting and foraging grounds as well as important migration routes at the crossroads of the Pacific and Indian Oceans. This includes the hawksbill turtle (*Eretmochelys imbricata*), leatherback (*Dermochelys coriacea*), and loggerhead turtles (*Caretta caretta*) (ADB, 2014).

Above: Indonesia's coastline provides essential nesting areas for marine turtles, including the critically endangered hawksbill turtle

Below: coral reefs provide forage and habitat for reef fish

Below, left: dense mangroves protect coastline in Halmahera



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Indonesia is also host to an exceptional diversity of other megafauna, both resident and transitory. The nation provides a vital corridor for migration for a range of whale species, including the blue whale (*Balaenoptera musculus*), sperm whale (*Physeter macrocephalus*), and orcas (*Orcinus orca*). Fifteen dolphin species identified in Indonesian waters include the spinner dolphin (*Stenella longirostris*), Fraser's dolphin (*Lagenodelphis hosei*), long- and short-beaked common dolphins (*Delphinus capensis* and *Delphinus delphis*) (Mustika et al., 2015).

Indonesia is home to an enormous diversity of shark species (Kaye, 2015), including a walking shark (*Hemiscyllium halmahera*), hammerhead sharks (in the family *Sphyrnidae*), tiger sharks (*Galeocerdo cuvier*), whitetip and blacktip reef sharks (*Triaenodon obesus* and *Carcharhinus melanopterus*).

Mobulids add to the impressive megafauna in Indonesia's waters, including manta rays (*Manta birostris* and *Manta alfredi*) and devil ray species (*Mobula*) (Herwata and Lewis, 2016). In addition to this, whale sharks (*Rhincodon typus*) are a common and impressive sight in some key geographies, the ocean sunfish (*Mola mola*) seasonally makes appearances, and dugong (*Dugong dugon*) can also be found in these waters.



F NOMPAS



BREHAN



Above, left: blacktip reef shark

Above: manta ray at cleaning station

Right: spotted dolphins



WWF / S BAHRI

At the other end of the scale, the microfauna is so diverse that it is assumed many species remain unknown to science and are yet to be discovered. Many microfauna species exhibit spectacular levels of camouflage and mimicry, and range from harmless to lethally dangerous, despite their size.

Known species include hundreds of different nudibranchs – the impressive *Xenia nudi* (*Phyllodesmium rudmani*), Allen’s ceratosoma (*Ceratosoma alleni*), and the rarely seen ghost melibe (*Melibe colemani*), to mention but a few. Elaborately decorated scorpion fish (such as the paddle flap *Rhinopias eschmeyeri* and the weed scorpionfish *Rhinopias frondosa*), the almost alien-looking hairy frog-fish (*Antennarius striatus*), and the picturesque dragonet (*Synchiropus picturatus*) are all fish species that require a trained eye to see. Similarly, the pygmy seahorses (family *Syngnathidae*) that hang by their ‘tails’ on the fronds of seagrass or on the edges of fan corals almost imperceptibly blend with the background.

At night, a plethora of microfauna can be seen dancing across reef areas, with shrimps like the harlequin (*Hymenocera picta*) and the striped bumblebee shrimp (*Gnathophyllum americanum*), alongside the hazardous miniature blue-ringed octopus (genus *Hapalochlaena*), and larger species of spiny lobsters (*Panulirus homarus*, *Panulirus ornatus*, etc.). These, as well as the abundant

mollusks, echinoderms, sponges, and other lifeforms that adorn the coastal areas make Indonesia a marine wildlife haven, rich in natural heritage.



Y PANGASTUTI

- Above: nudibranchs come in many colors and decorative patterns
- Left: mantis shrimp
- Above, right: mandarin fish emerge at dusk
- Middle, right: anemone shrimp
- Bottom, right: frogfish, white phase
- Over page: coral wall



COMMONS



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E PEARCE





CHAPTER 2

MARINE RESOURCE VALUES & UTILIZATION



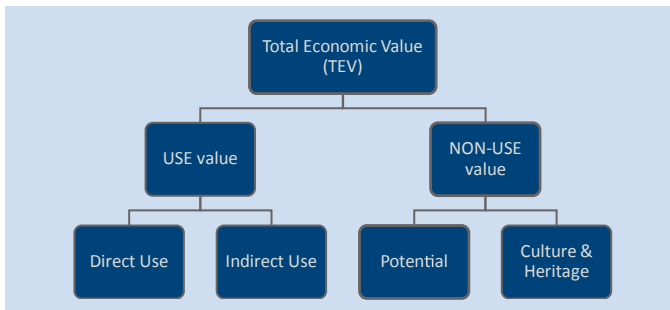


The ocean provides richness and texture to the life of all citizens. In this largest archipelagic nation in the world, comprised of island peoples, the ocean is a critical part of the nation's heritage.

The marine environment of Indonesia provides a wide range of valuable ecosystem goods and services that are essential for human health and well-being, locally, nationally, and internationally. These can be categorized as:

- **Use values** — These include direct use values, such as the extraction of goods (e.g. products from fishing, mining, and other practices) and services (e.g. marine tourism, recreation, and education), as well as indirect use values (such as climate regulation, flood prevention, and nutrient recycling).
- **Non-use values** — These include the potential future value of the various goods and services not yet realized and essential to future generations, as well as cultural and heritage values (with the marine environment providing richly for humans in terms of health and well-being and, in many cultures, playing a significant role in individuals' spiritual lives) (Chee, 2004; LeDoux and Turner, 2002).

TOTAL ECONOMIC VALUE BREAKDOWN



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When exploring the **direct use values** of the marine environment, two sectors are of particular importance to Indonesia: fisheries and tourism.

- Inside chapter: fish catch for sale at market
- Left: children from a Bajau fishing community playing



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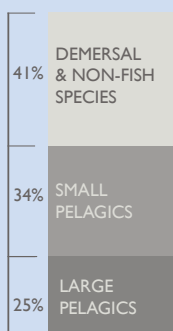
FISHERIES

Indonesia is the **world's second-largest producer of marine fishery commodities** (after China). Approximately 5.4 million tons of fish were produced in 2012 (FAO, 2011), with potential overall production assessed to be up to 9.93 million tons and total allowable catch set at 7.95 million tons (KepMen KP no. 47/2016).

Key fisheries include **demersal species** (e.g. grouper, snapper, parrotfish), **small pelagic fish** (e.g. scads, mackerel, and anchovies), **large pelagic fish** (e.g. tuna), and **non-fish species** (e.g. sea cucumber, crabs, shrimp). Pelagic species make up the majority of the overall catch in Indonesia, predominantly comprised of small pelagics, which alone contribute 34 percent of all fishery production in the country (Ditjen. Perikanan Tangkap, 2016). Of the large pelagic species harvested, Indonesia's tuna production nearly doubled from 2000 to 2016 (CEA, 2015), and the nation has today become the largest single supplier of tuna internationally.

INDONESIA: WORLD'S SECOND-LARGEST MARINE FISHERY PRODUCER

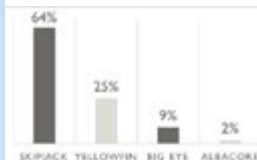
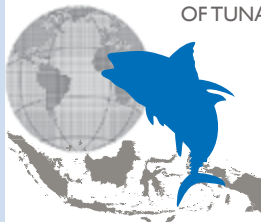
COMPOSITION OF MARINE FISHERIES PRODUCTION IN INDONESIA



TOTAL FISHERIES PRODUCTION IN INDONESIA



INDONESIA PROVIDES 16% OF THE WORLD'S SUPPLY OF TUNA



Above: yellowfin tuna is a key fishery commodity in Indonesia

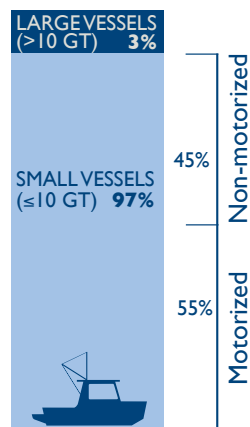
Above, right: fisherman catching grouper, a key demersal commodity in Indonesia

Source: Ditjen. Perikanan Tangkap, 2016. Produced by SSIC.



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INDONESIA'S FISHING FLEET



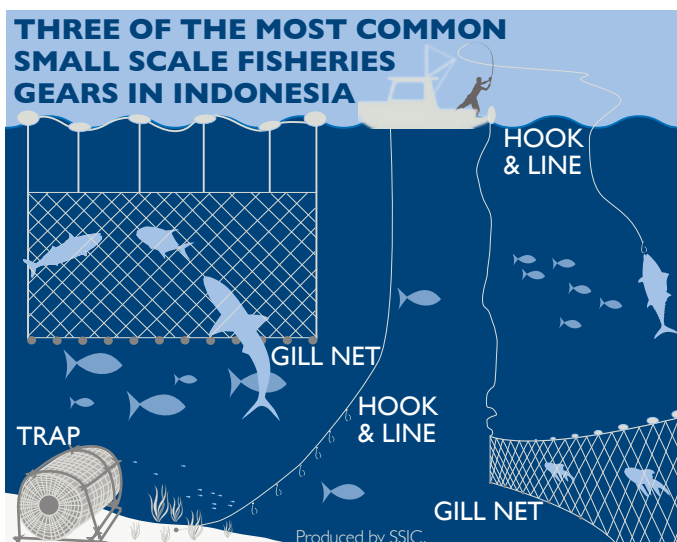
CAPTURE FISHERIES

Nearly two thirds of fishery commodities produced in Indonesia come from wild-caught fisheries (also referred to as 'capture fisheries'). These are the last large-scale wild-hunted commodities in the world and require individuals and groups of fishers to venture to sea.

The vast majority (approximately 97 percent) of Indonesia's fishing fleet consists of small-scale fishers, using small motorized and non-motorized boats of up to 10 gross tons (GT). By 2015, more than 540,000 vessels of this kind were estimated to be in operation across the country (Ditjen. Perikanan Tangkap, 2016), though the exact figure remains unknown, as such vessels have historically required no licensing (Solihin *et al.*, 2013).

Since the turn of the century, the number of small motorized vessels able to travel further distances to access wider fishing grounds has been steadily increasing, with 55 percent of Indonesia's small-scale fishing fleet (≤10GT) motorized by 2015. The most commonly used gear types are

hooks and lines (37 percent), gill nets and entangling nets (33 percent), and traps (8 percent) (Ditjen. Perikanan Tangkap, 2016).





B KHAN

The remaining three percent of Indonesia's fishing fleet is classified as 'large scale' (i.e. over 10 GT). These vessels tend to use more heavy-duty and impactful gears, including seine nets, purse seines and trawls. While proportionally these large-scale fishers represent only a small segment of Indonesia's overall fleet, their impact on fisheries is disproportionately greater, with larger catch volumes, more incidences of bycatch, and greater potential for degradation from destructive fishing methods, particularly from trawlers (Solihin *et al.*, 2013).

Overall, the fishery sector is estimated to provide **direct employment to more than six million people** and **indirect employment to millions more**. Some studies suggest that more than one third of Indonesians living in coastal areas are dependent on nearshore fisheries for their livelihoods (CEA, 2015).

In many coastal areas of Indonesia, an entire household can be involved in small-scale fisheries, with male members of the household predominantly engaged in fishing, while female members take care of shore-based work such as making preparations for the fishing trip, mending nets, beach gleaning, processing and selling fish and other marine products (ADB, 2014). Thus, women play a vital role in pre- and post-harvest small-scale fisheries.



L AUTOMO

Above: fishing boats in Maluku

Left: checking nets in readiness for fishing in eastern Indonesia

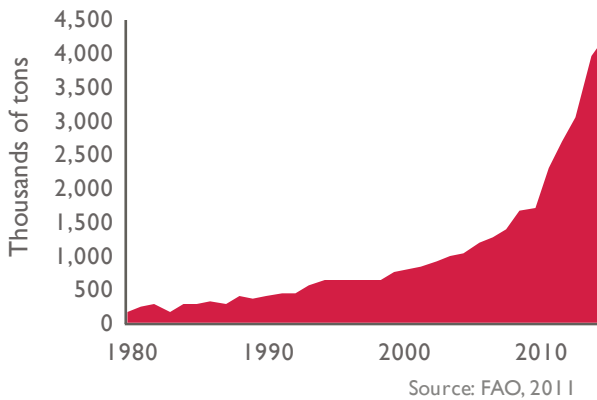
Right, top: integrated marine tourism and open net cage aquaculture in Maluku

Right, bottom: seaweed farming



CTC / Y PUTRA

AQUACULTURE PRODUCTION IN INDONESIA



AQUACULTURE

Aquaculture is defined as the farming of aquatic animals (and plants) for food or other purposes. Indonesia is ranked fourth in the world for the production of aquaculture commodities, accounting for 8.53 percent of the world's aquaculture produce (FAO, 2016).

More than one third of all Indonesia's marine production today comes from aquaculture. The industry has grown significantly in recent years, with more than 20 percent annual growth since 2005 (FAO, 2011).

Key aquaculture marine products include seaweeds, shrimps, and reef fish, with seaweeds dominating production in terms of volume and shrimps and reef fish dominating in terms of valued commodities.



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COMMONS

In some instances, marine aquaculture products are not entirely independent of capture fisheries. For example, some of the reef fish species cultivated, such as humphead wrasse (*Cheilinus undulatus*) and coral trout (*Plectropomus leopardus*), are still heavily reliant on wild-caught juveniles (fingerlings), resulting in an open system whereby capture fisheries and aquaculture combine. Therefore, a truly closed aquaculture system is not yet established for many reef fish products (Gillett, 2010).

Research has suggested that, due to the continually growing demand for affordable domestic fish supplies, aquaculture will become increasingly essential for meeting the nation's food security and nutrition needs. Studies also suggest that aquaculture may overtake capture fisheries as the major source of fish in Indonesia before 2030, creating up to 8.9 million jobs in production and generating nearly USD 40 billion in revenue (Phillips et al., 2015).

Above: humphead wrasse has been heavily fished across the nation

Below: seafood is a vital source of protein for Indonesian people



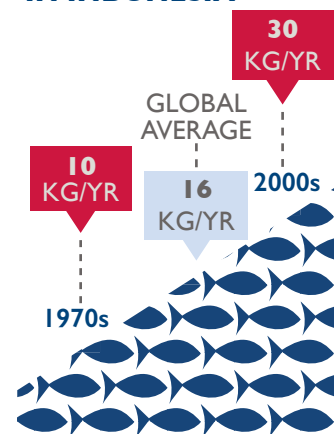
DOMESTIC FOOD SECURITY

Within Indonesia, fishery resources are vital for food security. Local demand for fishery products has been steadily increasing, with *per capita* local consumption almost tripling since the 1970s.

Today, *per capita* consumption of marine products in Indonesia is nearly twice the world average (FAO, 2016) and is estimated to provide about 54 percent of total animal protein in people's diets nationally. This is one of the **highest dependency rates in the world** (FAO, 2016).

More than half of all seafood is estimated to be consumed domestically in dried, salted, smoked, boiled, or fermented form (MMAF, 2015 data).

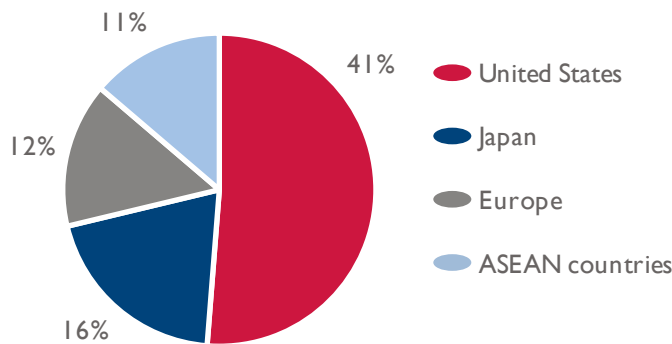
PER CAPITA FISH CONSUMPTION IN INDONESIA



Source: FAO, 2012. Produced by SSIC.

EXPORT TRADE

FISHERY EXPORT MARKETS



Source: Indonesia Investments, 2015

Internationally, the largest marine product export market is the United States (41 percent of all exports), followed by Japan, Europe, and ASEAN countries (Indonesia Investments, 2015). Shrimp remains the main export commodity, the vast majority of which comes from aquaculture (with less than 10 percent estimated to come from wild-caught stock (STIP, 2016). Other key export commodities are tuna and blue swimming crab. In 2013, the total value of exported fishery commodities was USD 3.8 billion.

Overall, the fishing industry has been estimated to account for 21 percent of Indonesia's agricultural economy and 3 percent of its national GDP (FAO, 2011).



RARE

Left and below: fish for sale at local markets



J MORGAN



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MARINE-BASED TOURISM

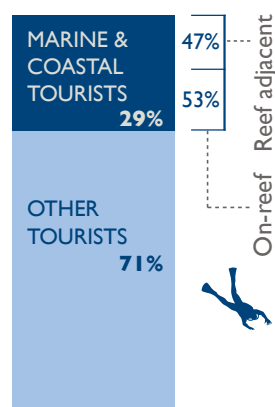
Tourism is an important component of the Indonesian economy as well as a significant source of foreign exchange revenues. It is the fourth-largest of all the goods and services export sectors and contributes more than USD 26 million to the nation's GDP (3.2 percent of total GDP) (Indonesia Investments, 2014).

Marine and coastal destinations are estimated to attract around 29 percent of all foreign and domestic tourist visitors each year. Of these, an estimated 53 percent are classified as 'on-reef tourists' (participating directly in reef-related activities, such as diving and snorkeling), with the remainder defined as 'reef-adjacent' tourists (those enjoying the indirect benefits of a healthy marine ecosystem, such as sandy beaches, sheltered water, food, and attractive views) (Spalding *et al.*, 2017).



DEPOSITPHOTOS.COM

TOURISM IN INDONESIA





T SCHULTZ



Good quality corals, the presence of charismatic megafauna, impressive schools of shoaling fish, and a large variety of microfauna (critters) make Indonesia a highly desirable destination for on-reef tourists. Indonesia is the world's fifth-best dive destination according to the Professional Association of Diving Instructors (PADI), and host to nearly half of the top ten dive sites in the world (as ranked by CNN). There are 710 identified dive sites in Indonesia (Putra, 2016), with more than 400 dive businesses operating across the country.

● Above, left: beaches are popular destinations for romantic holidays

Far left: diving in Gorontalo, Sulawesi

Above: wildlife watching

Left: coastal bungalow accommodation

WWF / K PRASETYO



COMMONS

The Government of Indonesia aims to further promote tourism as an industry, and to increase foreign visitor numbers from 9 million/year (in 2014) to 20 million/year (by 2019). Within this target, four million visitors (20 percent) are anticipated to be marine-based, and the government has identified 25 strategic marine tourism areas across the country on which to focus investment and support to boost marine-based enterprises. In addition to this, the government wants to target on-sea tourism, aiming to increase yacht-based tourism by almost eight times and to double the number of cruise ships by 2019 (Kemenpar, 2016; Natahadibrata, 2015; Rahim, 2013).



SSIC / E CARTER



Above: yacht-based tourism is set to rise

Left: liveaboard cruises operate throughout Indonesia

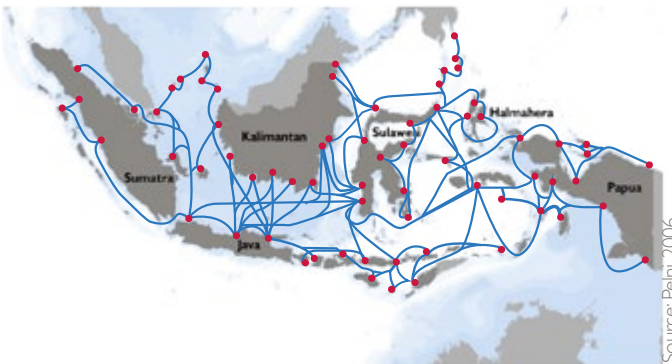
Above, right: cargo ship at sea



B KHAN

OTHER MARINE RESOURCE USES

PELNI SHIPPING LANES (NATIONAL SHIPPING COMPANY) INDONESIA



As an archipelagic country, Indonesia is highly dependent on the ocean as a means of transportation for much of its domestic and international trading network. The nation has 1,700 ports (Ray, 2008), which manage a total throughput of an estimated 968 million tons of cargo annually (2009 figures, Nathan Associates, 2011).

Other critical products provided by the marine environment include goods from mining (gas, oil, etc.), wave energy, tidal energy, medicines, sea salt, and seawater (which is increasingly used for transformation into fresh water through desalination). Other services include climate regulation, with ocean currents transporting warm water and precipitation from the equator toward the poles, and cold water from the poles back to the tropics, thus regulating the global climate. The physical presence of mangroves and fringing reefs also provides critical sea-defense services against storm surges, coastal erosion, and flooding.

Finally – and importantly – the ocean is responsible for the primary production of foundational food chain elements (plankton and associated organisms). These species play a vital role in the oxygenation of the planet, providing land-living species – including humans – with the air we breathe. Therefore without healthy oceans, humans simply cannot exist.



T SCHULTZ

NON-USE VALUES

While often overlooked, non-use values are essential to Indonesia's health and well-being. They include the ocean's *potential* for supporting future generations as well as the cultural and spiritual enrichment the seas bring.

Across a nation of more than 16,000 islands and numerous ethnicities and cultures, the ocean has played – and continues to play – an important role in many people's psychological and spiritual well-being.

Emotional connections to the ocean environment are complex. Coastal people frequently have a sense of special knowledge about the sea, an ability to 'read' the sea, in a way that enhances their prospects for survival in a dangerous environment. In some areas of Indonesia, there is a belief that the sea itself has a spiritual character, whether it be the goddess of the southern seas (*Nyai Roro Kidul*) in Java (Cribb and Ford, 2009) or the home of spiritual 'sea wives' for pearl divers in the Aru Islands (Spyer, 1997). Some communities live intimately with the ocean, such as the Bajau – a nomadic, seafaring people, often referred to as 'sea gypsies' – who have lived for centuries on boats or stilt houses on the sea.

Ancient cosmogonic beliefs across the archipelago are also closely connected to the ocean, from the Batak people's belief in the mighty marine dragon who helped shape the world (*Naga Padoha*) (Stöhr and Zoetmulder, 1965) to the stories in the *Tantu Pagelaran* manuscript, which describes how Vishnu anchored the free-floating island of Java to the ground by transforming into a giant turtle and taking a part of Mount Meru from India to pin Java in place (Soekmono, 1973).

These ancient beliefs show the power that the sea around Indonesia has had in shaping the nation's cultures and societies. Today, the ocean continues to provide richness and texture to the life of all citizens. In this largest archipelagic nation in the world, comprised of island peoples, the ocean is a critical part of the nation's heritage.



Above: *adat* (spiritual) leader of a coastal community in Maluku

Above, right: Bajau village (raised on stilts above the sea) at sunset

Right: Bajau fisherman at sea



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CTC / M KOREBIMA

OVERALL ECONOMIC VALUE OF INDONESIA'S MARINE ENVIRONMENT

In recent years, the ability to place a monetary value on the wide-ranging goods and services provided by the marine environment has become increasingly important. A law passed in Indonesia in 2009 (no. 32/2009) mandates that environmental resources be financially valued, to enable informed decision making about their use.

This is particularly important where multiple-user pressures are conflicting, and trade-offs between sectoral demands need to be appropriately assessed. **Such valuations can include both use and non-use values**, making them critical for incorporating considerations of sustainability as well as culture and heritage values into management decisions.

Natural resource valuation studies first began in Indonesia in the 1980s. The first marine resource valuation was undertaken in the early 1990s by the National Development Planning Agency (*Badan Perencanaan Pembangunan Nasional – Bappenas*), with support from the USAID Natural Resource Management Project. Since that time, economic valuation studies (in some form) have taken place in most of the country's major protected areas and other significant conservation areas.

In addition, these types of studies have become popular with undergraduates and postgraduates, and it is believed there may be hundreds of studies stored in Indonesian universities around the country. However, the varied methodologies utilized and widely different scales and scopes of these studies make it challenging to extrapolate information at the national level.



J MORGAN

Nonetheless, some estimates have been made of the overall value of key goods and services (use values) provided by Indonesia's marine environment. These estimates suggest that reef-related capture fisheries alone are worth USD 1.5 billion annually, and shoreline protection services provided by reefs and mangroves are worth USD 387 million annually (COREMAP, 2013).

Reefs in Indonesia are also estimated to directly generate approximately USD 127 million per year from marine tourism (COREMAP, 2013), predominantly in relation to dive and on-reef tourism activities. However, if reef-adjacent tourism revenue and national appeal as a destination due to the marine and coastal environment is factored into these estimates, the value is estimated to be as much as three billion USD per year (Spalding *et al.*, 2017).

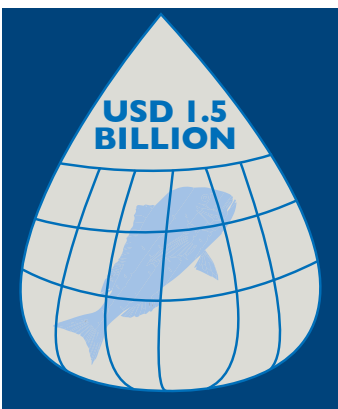
Above, left: mangroves provide shoreline protection services

Above: coral trout is an important demersal marine commodity

Over page: fishers heading out to sea in eastern Indonesia

INDONESIA'S MARINE ENVIRONMENT: ANNUAL ECONOMIC VALUE

REEF-RELATED
CAPTURE FISHERIES



SHORELINE
PROTECTION SERVICES



REEF-BASED
MARINE TOURISM



Sources: COREMAP, 2013; Spalding *et al.*, 2017. Produced by SSIC.



CHAPTER 3

KEY THREATS TO THE MARINE & COASTAL ENVIRONMENT





Threats to the marine and coastal environment include the loss of marine habitats and wildlife, as well as the over-exploitation of marine species.

LOSS OF MARINE HABITATS & WILDLIFE

Globally, all natural habitats and wildlife are facing unprecedented rates of loss from human activities. Indonesia is no exception. Marine and coastal ecosystems are becoming increasingly endangered by the human activities described below.

Destructive fishing

Illegal small-scale fishing practices such as blast fishing, beach seine netting, and poison fishing are all devastating to nearshore coral reef habitats and associated wildlife. At the more industrial end, fishing methods such as purse seine, trawl and gill nets can also be destructive and unsustainable. In addition to this, 'ghost nets' (nets that have been abandoned at sea) can be a pervasive threat to both marine habitats and wildlife.



Left: a coral reef affected by bleaching

Below, left: poison fishing

Below, right: preparing a homemade explosive for illegal bomb fishing

CTI PEW / T REED



J MORGAN





B. KAHN

Bycatch & injury

Every year, as many as 7,700 turtles in Indonesia's waters are estimated to be killed by accidentally getting caught in shrimp trawls and tuna long lines (ADB, 2014). Likewise, dolphins and other species are at threat from capture as bycatch, and surface-dwelling species (including dolphins, whales, and dugongs) are at risk of injury from fishing gears and boat propellers (ADB, 2014). In some areas, these species are still targeted by fishers for food or valuable body parts such as the teeth of dugong that are sold locally or exported.



Above: spotted dolphin injured by boat collision

Below: marine turtle caught as bycatch

Overfishing & invasive species

Removing targeted species at an accelerated rate, as happens through overfishing, can severely alter the trophic balance of a coral reef. A healthy reef has a wide range of species. Some species predate upon the reef, such as the crown-of-thorns sea-stars (COTs), and are in turn predated upon by other species, such as triggerfish. This dynamic keeps the ecosystem in balance.

CTC / Y PUTRA





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Therefore, extensive removal of select species by fishers can unbalance the relationship between predators and prey. This can lead to a population explosion in some species (such as COTs), which can leave coral reefs decimated. Similarly, algae species that are constantly competing with reefs for space, are kept in check by herbivorous fish grazing on them. Removing herbivorous fish can lead to algal overgrowth and the death of a reef.



Top: overcrowding of fishing grounds can result in overfishing

Bottom left: destructive reef-feeding COTs can proliferate on a reef when their natural predators are removed by fishing

Bottom right: clown triggerfish are natural predators of COTs, but are often overfished in coral reef areas

“Overfished reefs appear to be generally less resilient to stressors, more vulnerable to disease, and slower to recover from other human impacts.”

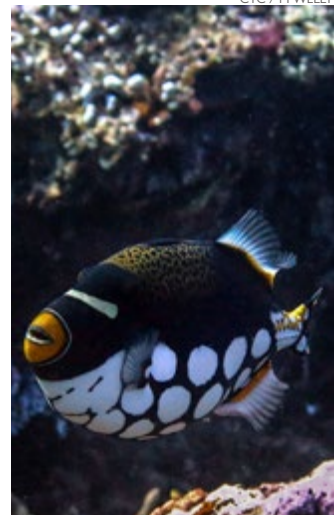
Burke et al., 2012: 18

This threat is compounded by invasive species, often introduced into an area via boat hulls or in the ballast water of international ships. The presence of non-indigenous species can severely disrupt local ecosystems and alter the marine habitat. Once present, they are difficult and complex to manage (ADB, 2014).

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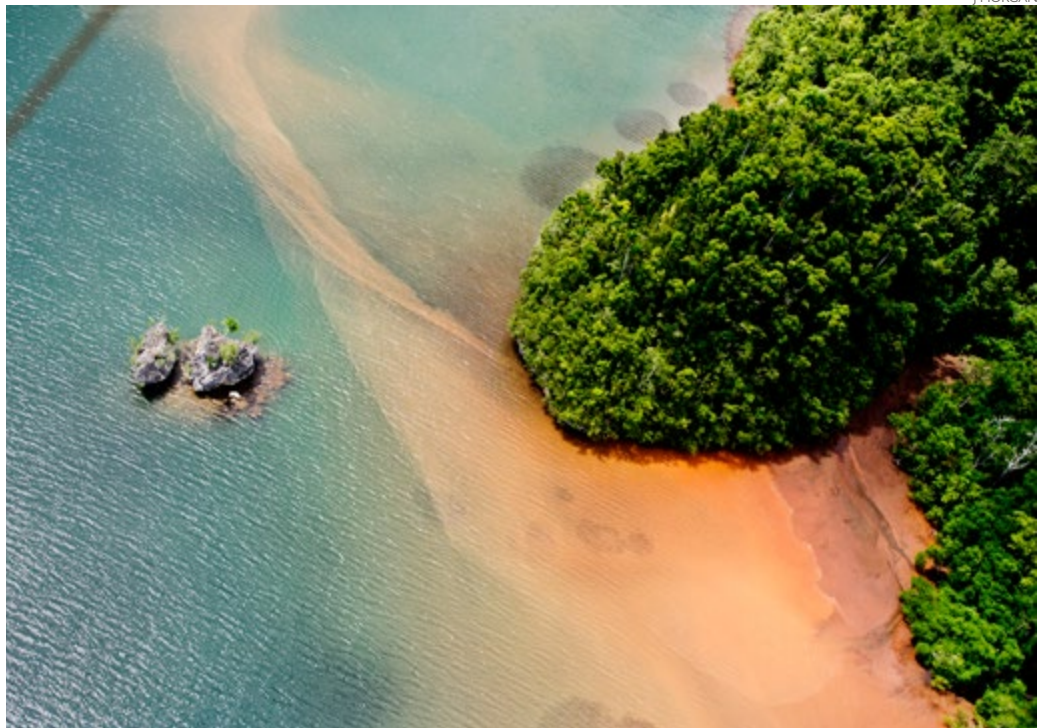


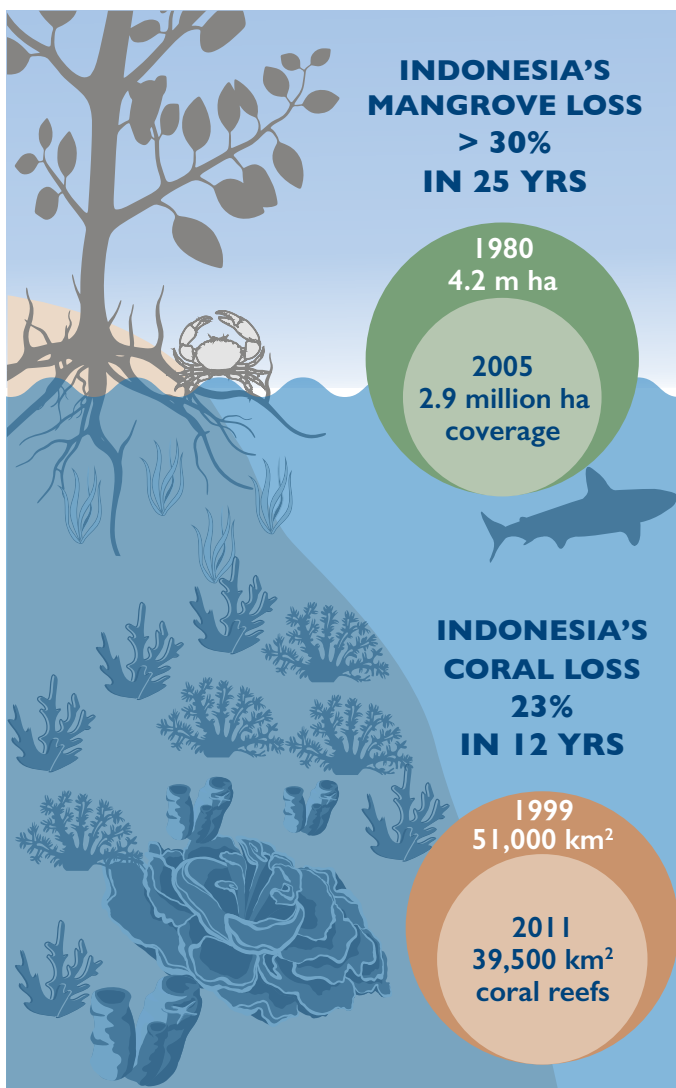
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Coastal developments

Developments can be in the form of infrastructure for human settlements, industrial establishments, tourism facilities, and aquaculture conversions. Impacts can be direct (through habitat loss or conversion) and indirect (through pollution and sedimentation). Activities such as dredging, land filling, and mining can directly alter the physical environment through the removal of habitat, whilst the byproducts of mining released into the marine environment can be toxic to marine ecosystems (Solihin *et al.*, 2013). Structures built in the water (such as jetties or barriers) can impact coastal areas through altered wave and water flow patterns. Coastal developments can also cause sedimentation, as can deforestation activities up-stream from coastal areas. Sediment loads entering the marine environment can smother and kill corals and seagrass beds.

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Sources: Burke *et al.*, 2002; Burke *et al.*, 2012; FAO, 2003. Produced by SSIC.

Habitat extraction

In some areas, corals are mined (extracted) to produce limestone and construction materials. They are also gleaned to make handicrafts, such as jewelry and souvenirs, and are used for pharmaceutical production (e.g. the manufacture of calcium supplements). In some areas, live corals are harvested for the international aquarium industry. Mangroves are felled to provide firewood, charcoal production, and construction materials, as well as source material for dyes and handicrafts.



Above and below, left: coastal development exposes the ocean to sedimentation

Below: felled mangrove wood provides construction material

USAID SEA / I.R. TARMIDI



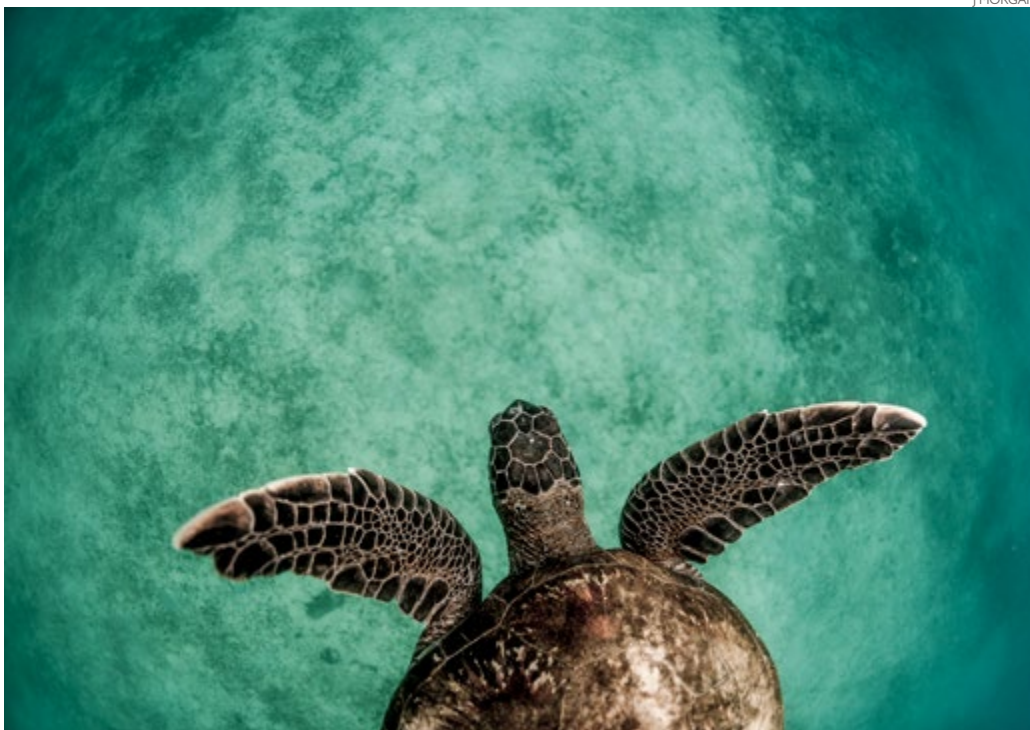


WCS

Wildlife trafficking & trade

Endangered, threatened, and protected (ETP) species are trafficked illegally through extensive national and international networks, to provide source materials for fashion, cosmetics, foods, tonics, and medicines. Marine turtles alone account for approximately three percent of all global illegal wildlife trade, and are primarily trafficked as ornamental objects, including whole stuffed turtles, whole polished shells, and products made from the shell (UNODC, 2016). Live animals such as dolphins, whale sharks, and even dugong are also captured and traded illegally to supply unscrupulous zoos, private collectors, and breeders (Hilton, 2016).

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CTC / Y PUTRA

Pollution

Pollution become an increasing threat to marine habitat and wildlife in recent decades. Plastics, in particular, are an enormous problem for marine and coastal environments. Indonesia is the second-largest plastic waste producer in the world after China (Jambeck *et al.*, 2015). In many areas, there are little to no municipal waste management systems in place, leading to high levels of plastic pollutants entering the marine environment. These are often ingested by marine species (such as turtles, whales, and seabirds), leading to sickness and/or fatalities. Additionally, when plastics physically break down, the resultant microplastics enter the ocean's food chain, creating a persistent challenge to the health of marine life and human consumers of marine life.



MMF / EGERMANOV

To compound the pollution challenge, as much as 40 percent of domestic sewage in Indonesia is estimated to be discharged untreated into the ocean, leading to excessive phytoplankton growth in the water. Domestic sewage also produces a toxin that can contaminate seafood and cause fish death (ADB, 2014).



Above, left: manta ray gill rakers seized by the authorities

Far left: green sea turtles are a target trade species

Above: beach pollution in Maluku

Left: marine pollution is an increasing threat to wildlife



DEPOSITPHOTOS.COM

On a larger scale, Indonesia's waters are susceptible to oil spills. An estimated 27 percent of the world's crude oil (or seven million barrels of crude oil per day) are transported through the shipping lanes of Indonesia. Between 1975 and 1997, oil spills from 104 shipping accidents led to the pollution of large areas of the marine and coastal environment (Nontji, 2000).

Climate change

Finally, and importantly, climate change negatively impacts marine habitats in a multitude of ways. Sea surface temperatures are increasing due to the warming of the atmosphere, which has already resulted in coral bleaching events and reef deaths. Ocean acidification is driven by increased absorption into the ocean of atmospheric carbon dioxide, and leads to weakened skeletal structures in species such as corals and crustaceans (ADB, 2014).

As sea levels rise – due to ice melting at the poles and the thermal expansion of ocean water – there is an increasing risk of the ocean inundating coastal regions, not only affecting marine habitat growth, but also severely impacting settlements and infrastructure. Some studies suggest up to 2,000 of Indonesia's islands may be lost under rising sea levels in the coming decades (The Jakarta Post, 2015).

Changes and uncertainties in weather patterns brought about by climate change can impact the behavior of marine migratory species and spawning patterns, posing a threat to fishery harvests. These uncertainties also reduce fishers' ability to predict weather, winds, and currents, posing an increasing threat to human safety at sea (Siregar *et al.*, 2012).

WHAT IS CORAL BLEACHING?

Coral polyps rely on symbiotic algae (*zooxanthellae*) that live in the polyps' tissues and help provide nutrition (from photosynthesis), complementing the food consumed by polyps through their tentacles. It is these algae that give polyps – and the entire reef community – their color. When water temperatures warm up, the corals get stressed and expel their algae, which turns them entirely white. This is known as 'bleaching'. While they can continue to survive like this for some days or weeks, if the temperatures stay high and the algae do not return, the corals die (known as 'mortal bleaching').



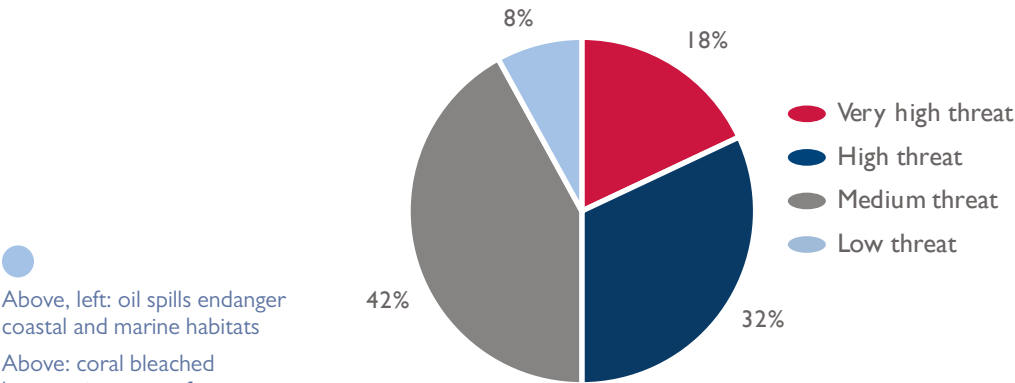
COMMONS

All of these threats are globally relevant. Together they have led to more than 90 percent of the world’s reefs being considered ‘at risk’ (Burke *et al.*, 2012). Within the Coral Triangle region, 85 percent of coral reefs are considered to be ‘under threat’, and **within Indonesia, 50 percent of all reefs are categorized as ‘under high threat’** (Burke *et al.*, 2012).

These threats have also led to the loss of between 20 and 35 percent of mangroves globally (Polidoro *et al.*, 2010). This decline continues at an estimated one percent globally per year (Wilkie and Fortuna, 2003). In Southeast Asia, mangroves declined by up to 70 percent in the latter decades of the 20th century (Barbier and Cox, 2002).

All marine turtle species are considered ‘at risk’, with the hawksbill turtle (*Eretmochelys imbricata*) now considered critically endangered. Dugong populations in Indonesia shrank from an estimated 10,000 in the 1970s to less than 1,000 by the mid-1990s (De Longh *et al.*, 1995). In addition to this, a number of fish, mollusks, and corals are considered vulnerable in Indonesia, including the humphead wrasse (*Cheilinus undulatus*) (Dirhamsyah, 2011) and giant clams (*Tridacna derasa* and *Tridacna gigas*) (ADB, 2014).

REEFS UNDER THREAT IN INDONESIA



Source: Burke *et al.* 2012



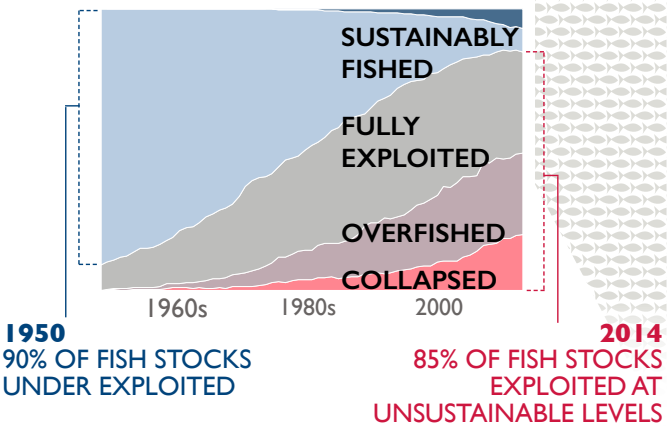
CTC / Y PUTRA

OVER-EXPLOITATION OF FISHERIES & MARINE PRODUCTS

Over-exploitation of marine products globally has reached a critical level in recent years. This is particularly relevant in fisheries, where over-exploitation is putting entire fisheries at risk of collapse.

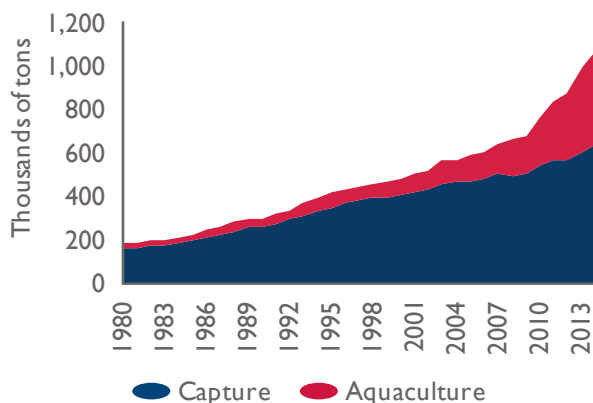
Global fishery production began to rise steeply in the 1950s, reaching a peak of 78.4 million tons/year in 2014 (FAO, 2016). This unprecedented rate of extraction from the sea has resulted in fisheries around the world becoming increasingly unsustainable and, in some areas, reaching the point of collapse.

GLOBAL FISH STOCKS AT THE POINT OF COLLAPSE



Source: SAU, 2016. Reproduced by SSIC.

TOTAL FISHERY PRODUCTION IN INDONESIA



Source: FAO, 2011



CTC

This level of over-exploitation presents a real threat of fish populations collapsing and ecosystems subsequently losing their ability to function. This in turn presents a very real concern for the future food security of the world's growing population (FAO, 2016).

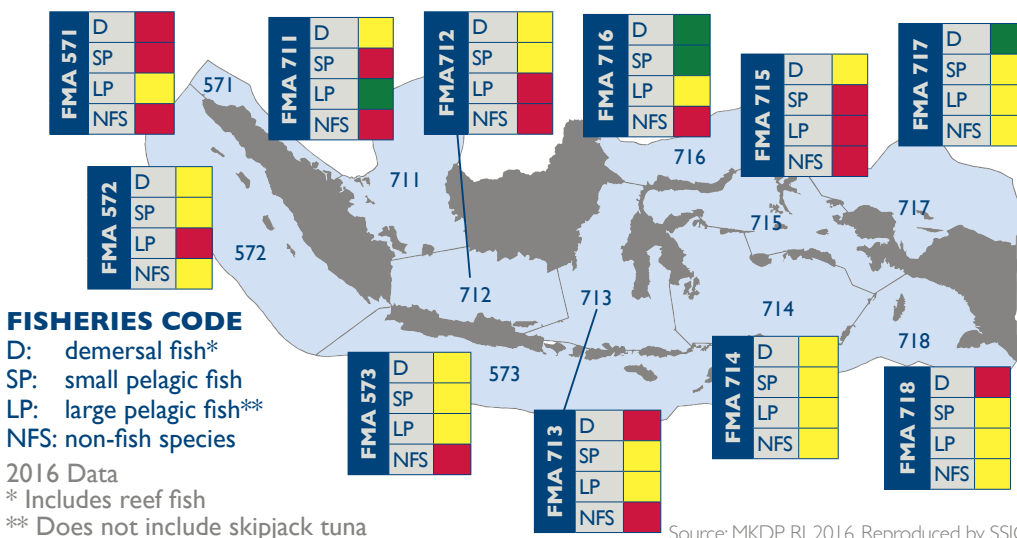


Above, left: reef fish targeted by fishers

Above: a fisherman with a catch of tuna in Halmahera

In Indonesia, fishery production has also been increasing steadily since 1950, and while production growth rates globally have now started to slow down to less than one percent/year, Indonesia's growth rate continues to accelerate. Between 2003 and 2014 alone, production increased by more than 30 percent (FAO, 2016).

Due to this escalating production, Indonesia's fisheries are considered highly vulnerable to potential collapse (Hughes *et al.*, 2012). By 2015, numerous fisheries across the nation had already reached a level classified as '**over exploited**' (red), where catch rates are considered no longer sustainable, with other fisheries already at a '**fully exploited**' (yellow) level.





DEPOSITPHOTOS.COM

Over-exploited stocks in many areas include:

- **Demersal species** — These fish live and feed on or near the seabed in coastal areas (for example, grouper and snapper fish). They are common targets for the small-scale fishers who dominate the fishing fleet of Indonesia, and assessments suggest many stocks across the country are beginning to transition from ‘fully exploited’ to ‘over exploited’. Because of their life history attributes, groupers – a key commodity for local consumption as well as export – are particularly susceptible to over-exploitation, and the common fishing method of targeting their spawning aggregations (SPAGs) is a serious concern. In addition to catching adult groupers for direct food consumption, the live reef fish food trade captures wild fry and fingerlings (very young wild fish) to supply the grouper aquaculture industry across Southeast Asia, further diminishing the wild population (ADB, 2014).
- **Small pelagic species** — These are small fish that live and feed in open water. Often shoaling and found together in large numbers, examples include scads, mackerel, and anchovies. In Indonesia, these species have declined so much that by the turn of the century the nation had to start importing these products from Vietnam and India, not only to meet human consumption needs, but also to provide bait for tuna long line fisheries (FAO, 2011).
- **Large pelagic species** — These fish also inhabit open water but travel far greater distances and across much deeper terrains, for example tuna. These species are also heavily targeted for market trade, and studies have shown that the individual sizes and overall catches of large pelagics have declined sharply in recent decades. Indeed, some species (such as bigeye tuna, *Thunnus obesus*) are no longer found at all in some of the most heavily fished areas of the country (ADB, 2014).
- **Non-fish marine products** — This refers to other marine animals that are captured or extracted from the wild, including species such as sea cucumbers, lobsters, crabs, and shrimp. These species have also proved vulnerable to over-exploitation in Indonesia. In the eastern part of the country, shrimp harvests have been recorded at three times the maximum sustainable yield. In the same region, studies have shown sharp declines in sea cucumber populations since the turn of the century due to over extraction (Malik, 2013; Yusron, 2009).



Above: demersal fish are a key target for fishers



DEPOSITPHOTOS.COM

WHAT IS A SPAWNING AGGREGATION?

A spawning aggregation (SPAG) is a regular gathering of adult fish for the purpose of spawning. Many species of economically important coral reef fish form spawning aggregations, which can consist of thousands of fish. Unfortunately, fishers who target SPAGs can wipe out an entire aggregation at one time, effectively removing the breeding stock from that vicinity, and thus significantly reducing the reproductive potential of that species.

The challenge lies not only in the sheer scale of extraction, but also in the type of extraction. Many stocks suffer from the removal of young juvenile fish before they can reach optimal reproductive age (growth overfishing), whilst others suffer from the removal of the large and highly fecund (fertile) older females of the population, reducing the overall larvae and recruits such that levels are insufficient to replenish the population (reproductive overfishing).

Issues are compounded by the fact that local, law-abiding fishers are not the only groups active in Indonesia's waters, and illegal, unreported, and unregulated (IUU) fishing poses an additional major challenge to the nation's sustainability.

Above: schools of small pelagic fish make up the majority (by volume) of catch harvested from Indonesia's oceans

Left: non-fish species are key marine commodities, like this large mangrove crab captured in West Papua



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DG PSDKP

ILLEGAL, UNREPORTED, & UNREGULATED (IUU) FISHING

IUU fishing is rampant in Indonesian waters, and it is estimated that 25 percent of Indonesian fish are ‘stolen’ by IUU fishing (Solihin *et al.*, 2013). IUU fishing encompasses both unknown foreigners operating without permission in Indonesian waters and Indonesian fishers who use destructive fishing methods, illegal fishing gear, or who are unregistered and whose catch goes unreported. Studies have suggested that foreign-operated IUU vessels predominantly come from neighboring nations, including Vietnam, the Philippines, Thailand, and Malaysia, and tend to operate from large vessels (over 80 GT) (DFW Indonesia, 2016).

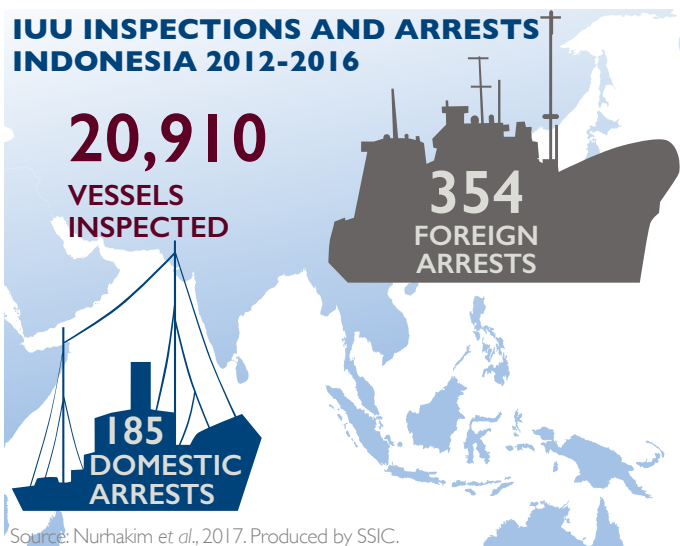
IUU fishing in Indonesia is symptomatic of insufficient law enforcement both in ports and at sea. Indonesian fishing grounds are vast and controlling these areas is inevitably challenging. Studies have suggested that IUU fishing costs the state up to about USD 25 million per year (DFW Indonesia, 2016), and this significant financial loss makes tackling this threat a high priority for the Indonesian government.



Above: illegal vessels apprehended in Indonesian waters

Above, right: overfishing leads to reduced fishery harvests, which in turn can lead to mal- and undernourishment in coastal communities that are dependent on this resource for food security

Over page: fishing vessel in harbor in eastern Indonesia





J MORGAN

IMPACT ON LIVELIHOODS & FOOD SECURITY

As the majority of Indonesia's fishing fleet is comprised of small-scale artisanal fishers heavily reliant on reef-based and nearshore fisheries, future marine product scarcity is expected to impact these fleets in many ways. Fishing grounds are expected to move further away as local depletion occurs, requiring more time and fuel to reach. The grounds are likely to be more spatially limited, resulting in higher levels of competition between fishers over steadily decreasing resources, leading to social unrest and possibly conflict. A key factor in managing nearshore fisheries for the benefit of small-scale artisanal fishers is to ensure their rights to the fishing grounds without fear of intrusion by larger and more efficient fishing vessels.

In addition to this, with Indonesia having one of the highest dependency rates in the world on protein from marine products, future scarcity is anticipated to impact the nutritional well-being of the population, with potentially devastating consequences for mal- and undernourishment in some regions of the country (Imir, 2013). In this regard, the thrust for improved management of marine resources must include a food-security dimension so that coastal dwellers are assured of adequate food supplies. This need sometimes competes with the desire to export commercially valuable fishery resources that are captured using ever more efficient fishing gears.



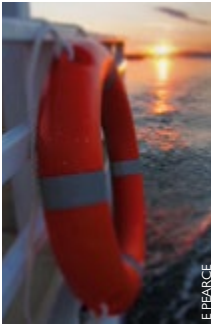
read more about IUU fishing in chapter four, action framework: Enforcing the Law



CHAPTER 4

MARINE & COASTAL GOVERNANCE & INSTITUTIONAL FRAMEWORKS





Marine and coastal governance in Indonesia is the primary responsibility of the state, as laid out in the Constitution of the Republic of Indonesia.

“Indonesia should be aware of and see the oceans as part of the nation’s identity. Its prosperity and its future are determined by how we manage the oceans.”

President Joko ‘Jokowi’ Widodo, announcing one of the five pillars of Indonesia’s maritime axis doctrine at the 9th East Asia Summit, November 2014.

The Constitution of the Republic of Indonesia reads: “Land and water and natural resources therein shall be controlled by the State and shall be utilized for the greatest benefit or welfare of the people.” (Sc. 33, Pa 3, 1945). To that end, marine and coastal management is implemented at a range of levels:

National	central government
Regional	11 fisheries management areas
Provincial	34 provinces
District / Municipality	515 districts / regencies (<i>kabupaten</i>) / cities (<i>kota</i>)
Community	6,487 sub-districts (<i>kecamatan</i>) > 76,000 villages (<i>desa / kampung</i>)

PerMen Dagri no.56/2015



Left: schooling barracuda

Below: children playing on a jetty in Maluku

CTC / M WELLY





PHOTODEPOSITORY.COM

NATIONAL GOVERNANCE & INSTITUTIONAL FRAMEWORKS

Overall national-level responsibility lies with the Coordinating Ministry for Maritime Affairs, which oversees several other ministries, amongst them the Ministry of Marine Affairs and Fisheries (MMAF), which is the lead agency for marine and coastal management. The MMAF currently operates under a strategic plan for 2015–2019, released under minister Susi Pudjiastuti and authorized under ministerial decree (PerMen KP no. 25/2015 and PerMen KP no. 45/2015), which makes it a legally binding document. This plan operates under three pillars: **sovereignty**, **sustainability**, and **prosperity**.

Other government bodies, situated within the Coordinating Ministry for Maritime Affairs, with whom responsibilities are partially shared, are the Ministry of Transportation, the Ministry of Tourism, and the Ministry of Energy and Mineral Resources. In addition, the Ministry of Home Affairs and the Ministry of Environment and Forestry are involved in a range of marine and coastal governance issues.

As well as these state institutions, at least 17 major NGOs are actively involved in supporting marine and coastal management at the national level in Indonesia. Research, science, and governance support is also provided by at least 27 universities and academic institutions across the country, and several international academic institutes offer strong research support to Indonesia.

The national government is responsible for managing the nation's marine and coastal environment through the enactment of relevant laws, policies, and associated regulations and by implementing practicable management regimes and providing law enforcement.

To this end, a wide range of laws and policies have been enacted to promote the sustainable use and effective management of marine resources. Additionally, Indonesia has signed and ratified a range of international conventions.



Above: container ship leaving port

ORGANIZATIONAL SUMMARY OF MMAF

The MMAF was established in 1999 (Presidential Decree no. 136) and has evolved into nine operating units at echelon I level (based on PerMen KP no. 6/2017). These are:

- two leadership support agencies – the Secretary General and the Inspectorate General
- seven technical implementation agencies – five Directorate Generals (DGs) and two agencies.

The Secretary General (SecGen) coordinates and guides implementation and administration of all tasks within the MMAF (PerMen KP no. 6/2017: 6) under which the DGs and agencies operate:

- **DG Marine Spatial Management** (*Direktorat Jenderal Pengelolaan Ruang Laut – PRL*) oversees marine spatial planning, marine conservation, biodiversity management, as well as coastal and small islands management (p.46).
- **DG Capture Fisheries** (*DJ Perikanan Tangkap – PT*) oversees all capture fishery resource management, including managing ports, licenses, vessels, and gears (p.89).
- **DG Aquaculture Fisheries** (*DJ Perikanan Budidaya – PB*) oversees aquaculture production, health, seeding, and management (p.140).
- **DG for Strengthening the Competitiveness of Marine and Fishery Products** (*DJ Penguatan Daya Saing Produk Kelautan dan Perikanan – PDSPKP*) oversees fishery business promotion, marketing, and investments, as well as processing, quality control, and logistics, aiming to strengthen the competitiveness and sustainability of Indonesian fisheries (p.185).
- **DG Marine and Fishery Resources Surveillance** (*DJ Pengawasan Sumber Daya Kelautan dan Perikanan – PSDKP*) oversees marine and fishery surveillance and law enforcement, including vessel monitoring (p.228).
- **The Agency for Marine and Fishery Research and Human Resources** (*Badan Riset dan Sumber Daya Manusia Kelautan dan Perikanan – BRSDM*) oversees marine- and fisheries-related capacity building, training, and education as well as research (p.280).
- **The Agency for Fish Quarantine, Quality Control, and Fishery Product Safety** (*Badan Karantina Ikan, Pengendalian Mutu dan Keamanan Hasil Perikanan – BKIPM*) oversees the organization of fish quarantines, quality control, and fishery products safety, as well as biological safety (p.308).

Meanwhile, The Inspectorate General organizes internal controls and supervisions within the MMAF (p.267).

Additionally, expert advisors provide strategic guidance to the minister, particularly on issues surrounding:

- economic, social, and cultural concerns
- community and inter-institutional relations
- ecological and fishery resource management (p.333).

Staff: The number of staff and field technical units working under the MMAF and its associated regional offices has grown considerably in recent years, and includes thousands of new hires to be trained to serve as extension officers in districts and provinces across the country.

INTERNATIONAL MARINE AND COASTAL MANAGEMENT-RELATED CONVENTIONS TO WHICH INDONESIA IS A SIGNATORY, AND RATIFICATIONS*

<p>UU no. 19/1961 Convention on Fishing and Conservation of the Living Resources of the High Seas; Convention on the Continental Shelf; and Convention on the High Seas created at the United Nations Convention on the Law of the Sea in Geneva (1958)</p> <p>KepPres no. 107/1968 The International Convention for the Safety of Life at Sea (SOLAS) (1960)</p> <p>KepPres no. 288/1968 Convention on the International Hydrographic Organization, General Regulations and Financial Regulations (1967)</p> <p>KepPres no. 26/1976 Agreement for the Facilitation of Search of Ships in Distress and Rescue of Survivors of Ship Accidents (1975)</p> <p>KepPres no. 36/1976 Asian-Ocean Postal Convention and its Detailed Regulations as Revised in the AOPU Congress (1962)</p> <p>KepPres no. 47/1976 International Convention on Load Lines (CLL) (1966)</p> <p>KepPres no. 65/1977 Asian-Oceanic Postal Convention (1968)</p> <p>KepPres no. 18/1978 The International Convention on Civil Liability for Oil Pollution Damage (1969)</p> <p>KepPres no. 19/1978 The International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (1971)</p> <p>KepPres no. 43/1978 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (1973)</p> <p>KepPres no. 50/1979 Convention on the International Regulation for Preventing Collisions at Sea (COLREG) (1972)</p> <p>KepPres no. 65/1980 International Convention for the Safety of Life at Sea (SOLAS) (1974)</p> <p>KepPres no. 26/1983 Amendments to articles 17, 18, 20, and 51 of the Convention on the International Maritime Organization (1979)</p>	<p>UU no. 17/1985 United Nations Convention on the Law of The Sea (UNCLOS) (1982)</p> <p>KepPres no. 26/1986 ASEAN Agreement on the Conservation of Nature and Natural Resources (1985)</p> <p>KepPres no. 46/1986 Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, 1973 (with annexes, final act and International Convention of 1973). Concluded at London on 17 February (1978)</p> <p>KepPres no. 60/1986 The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) of 1978</p> <p>KepPres no. 1/1987 Amendment (1979) to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973)</p> <p>KepPres no. 21/1988 Protocol of 1978 relating to the International Convention for the Safety of Life at Sea (1974)</p> <p>KepPres no. 33/1989 International Convention for Safe Containers (CSC) (1972)</p> <p>KepPres no. 5/1989 International Convention on Tonnage Measurement of Ships (1969)</p> <p>KepPres no. 26/1989 Convention concerning the Protection of the World Cultural and Natural Heritage (1972)</p> <p>KepPres no. 48/1991 Convention on Wetlands of International Importance Especially as Waterfowl Habitat (1971)</p> <p>KepPres no. 86/1993 Agreement on the Organization for Indian Ocean Marine Affairs Cooperation (IOMAC) (1990)</p> <p>KepPres no. 61/1993 Basel Convention for the Control of Transboundary Movement of Hazardous Waste and Disposal (1989)</p> <p>UU no. 6/1994 The United Nations Framework Convention on Climate Change (1992)</p>	<p>UU no. 5/1994 United Nations Convention on Biological Diversity (1992)</p> <p>KepPres no. 14/1996 Amendments to the Convention on the International Maritime Organization (Institutionalization of the Facilitation Committee) (1991)</p> <p>KepPres no. 52/1999 Protocol of 1992 to Amend the International Convention on Civil Liability for Oil Pollution Damage (1969)</p> <p>KepPres no. 178/1999 Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea (1982)</p> <p>KepPres no. 51/2002 Convention on Facilitation of International Maritime Traffic (1965)</p> <p>UU no. 17/2004 Kyoto Protocol to the United Nations Framework Convention on Climate Change (1997)</p> <p>UU no. 21/2004 Cartagena Protocol on Biosafety to the Convention on Biological Diversity (2000)</p> <p>PerPres no. 44/2005 International Convention on Maritime Liens and Mortgages (1993)</p> <p>PerPres no. 109/2007 Convention for the Conservation of Southern Bluefin Tuna (1993)</p> <p>UU no. 1/2008 International Labor Organization, Seafarers' Identity Documents Convention No. 185 Concerning Revising the Seafarers' Identity Documents Convention (1958) Revised (2003)</p> <p>UU no. 19/2009 Stockholm Convention on Persistent Organic Pollutants (2001)</p> <p>UU no. 21/2009 The United Nations Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (2001)</p>	<p>PerPres no. 25/2009 ASEAN Sectoral Integration Protocol for Fisheries (2004)</p> <p>PerPres no. 29/2012 Annex III, IV, V International Convention for the Prevention of Pollution from Ships (MARPOL) as modified by the Protocol (1978)</p> <p>PerPres no. 30/2012 International Convention Maritime Search and Rescue, 1979 with Annex and 1998 Amendments to the International Convention on Maritime Search and Rescue, 1979 (Resolution Maritime Safety Committee 70 [69]) (1998)</p> <p>UU no. 11/2013 Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from Their Utilization to the Convention on Biological Diversity (2010)</p> <p>PerPres no. 61/2013 Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (2000)</p> <p>PerPres no. 19/2014 Agreement on the Establishment of the Regional Secretariat of the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security with Rules of Procedure, Staff Regulations (2011)</p> <p>PerPres no. 65/2014 International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001</p> <p>PerPres no. 132/2015 International Convention for the Control and Management of Ships' Ballast Water and Sediments (2004)</p> <p>UU no. 15/2016 Maritime Labour Convention (2006)</p> <p>PerPres no. 43/2016 Agreement on Port State Measures to Prevent, Deter, and Eliminate Illegal, Unreported, and Unregulated Fishing (2009)</p> <p>PerPres no. 46/2016 Host Country Agreement Between the Government of the Republic of Indonesia and the Regional Secretariat of the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security on Privileges and Immunities (2015)</p>
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KEY OVERARCHING NATIONAL REGULATIONS RELATING TO MARINE AND COASTAL MANAGEMENT

UU no. 1/1973

Landas Kontinen Indonesia (Continental Shelf of Indonesia) – regulates the utilization of natural resources on the continental shelf of Indonesia.

UU no. 5/1983

Zona Ekonomi Eksklusif Indonesia (Indonesian Exclusive Economic Zone) – regulates the sovereign rights, other rights, jurisdiction, activities, and obligations of the Republic of Indonesia in the Exclusive Economic Zone.

UU no. 5/1990

Konservasi Sumberdaya Alam Hayati dan Ekosistemnya (Conservation of Natural Resources and their Ecosystems) – regulates the sustainable use of biological natural resources as well as the protection and preservation of ecosystems and of plant and animal diversity.

UU no. 9/1990

Kepariwisata (Tourism) – regulates tourism.

UU 16/1992

Karantina Hewan, Ikan, dan Tumbuhan (Quarantine of Animal, Fish, and Plants) – provides the legal framework for animal, fish, and plant quarantine to prevent the entry of pests and diseases on the territory of the Republic of Indonesia.

UU no. 6/1996

Perairan Indonesia (Indonesian Waters) – provides the legal framework of territorial sovereignty, jurisdiction, rights, obligations, and activities in Indonesian waters; it is based on Wawasan Nusantara.

UU no. 41/1999,

amended by UU no.

19/2004 Kehutanan (Forestry) – provides the legal framework for the status and management of forests.

UU no. 07/2004

Sumberdaya Air (Water Resources) – regulates the management of water resources.

UU no. 25/2004

Sistem Perencanaan Pembangunan Nasional (National Development Planning System) – provides the legal framework for development planning by the central and local government.

UU no. 31/2004,

amended by UU no.

45/2009 Perikanan

(Fisheries) – provides the legal framework for the management of fish resources.

UU no. 16/2006

Sistem Penyuluhan Pertanian, Perikanan, dan Kehutanan (Extension System for Agriculture, Fisheries, and Forestry) – provides the legal framework for the implementation

of extension support for agriculture, fisheries, and forestry.

UU no. 24/2007

Penanggulangan Bencana (Disaster Management) – regulates disaster management, assessment, risk and response in Indonesia.

UU no. 26/2007

Penataan Ruang (Spatial Management) – regulates spatial management, including spatial planning, spatial utilization, and control of spatial utilization.

UU no. 27/2007,

amended by UU no.

1/2014

Pengelolaan Wilayah Pesisir dan Pulau-Pulau Kecil (Coastal and Small Islands Management) – regulates coastal and small island resource management in areas acknowledging the local and traditional communities living in these areas.

UU no. 17/2008

Pelayaran (Shipping) – regulates shipping activities as follows: a) all internal water transport activities (by sea, river, and lake), ports, shipping safety and security, as well as protection the maritime environment in Indonesian waters; b) all foreign ships sailing in Indonesian waters; and c) all Indonesian vessels sailing outside Indonesian waters.

UU no. 43/2008

Wilayah Negara (Indonesian Territory) – defines the scope of Indonesian territory, the country's territorial boundaries, the sovereign rights of the Republic of Indonesia in the Exclusive Economic Zone and on the Continental Shelf, as well as its supervisory rights in the Additional Zone.

UU no. 4/2009

Pertambangan Mineral dan Batubara (Minerals and Coal Mining) – regulates the management

of mineral and coal mining.

UU no. 31/2009

Meteorologi, Klimatologi dan Geofisika (Meteorology, Climatology, and Geophysics) – provides the legal framework for meteorological, climatological, and geophysical assessments and responses.

UU no. 32/2009

Perlindungan dan Pengelolaan Lingkungan Hidup (Environmental Protection and Man-

agement) – regulates environmental protection and management, including principles, objectives, and scope; rights, obligations, and prohibitions; environmental dispute resolution; criminal provisions; as well as management of hazardous and toxic materials.

UU no. 18/2012

Pangan (Food) – regulates food management, including food planning, availability, affordability, nutrition, food safety, labeling and advertising, and research and development.

UU no. 21/2014

Panas Bumi (Geothermal)

– regulates reform and reorganization of geothermal activities, including geothermal exploitation for direct and indirect utilization, land use, rights and obligations, data and information, guidance and supervision, and community participation.

UU no. 23/2014

Pemerintahan Daerah (Local Government) – provides the legal framework for promoting efficiency and effectiveness in local government.

UU no. 32/2014

Kelautan (Marine) – provides the legal framework for the management of marine resources, addressing marine area development and management, spatial management, and marine environmental protection, defense, security, law enforcement, safety, governance, institutions, and community participation.

UU no. 7/2016

Perlindungan dan Pemberdayaan Nelayan, Pembudidayaan Ikan dan Petambak Garam (Protection and Empowerment for Fishermen, Fish Farmers, and Salt Farmers) – provides a legal framework for the protection and empowerment of fishermen, fish farmers, and salt farmers, including their families, where these are involved in processing and marketing.

* UU (Undang-Undang) = Act, KepPres (Keputusan Presiden) = Presidential Decree, PerPres (Peraturan Presiden) = Presidential Regulation



J MORGAN

REGIONAL GOVERNANCE

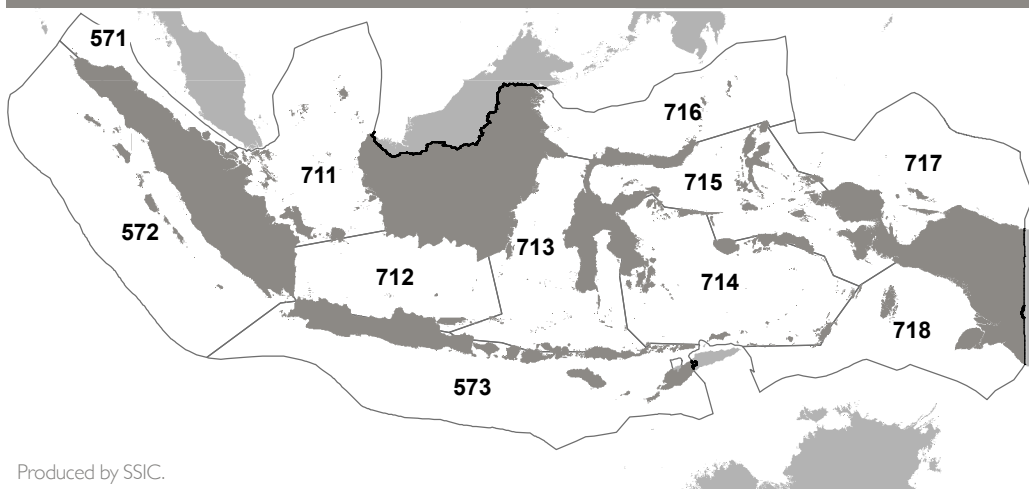
In 2004, the government recognized the importance of subdividing the nation's waters into more manageable areas due to the difficulty of managing marine waters across such a vast archipelago, particularly with regard to fisheries (law no. 31/2004, article 7). This led to the delineation of nine different **fisheries management areas** (FMAs), based on the location of landing sites. However, in 2009 the National Commission for Stock Assessment (*Komisi Nasional Pengkajian Sumber Daya Ikan – KOMNAS KAJISKAN*) revised the boundaries of these areas based on international standards, leading to the establishment of 11 FMAs (PerMen no. 01/2009).

These FMAs are large and host to many types of fisheries and ecosystems, ranging from small-scale nearshore fisheries on coral reefs to large-scale offshore fisheries.



Above: fishing boats in Sulawesi, FMA 713

FISHERIES MANAGEMENT AREAS - REPUBLIC OF INDONESIA



Produced by SSIC.

II FMAs	MARINE AREAS INCLUDED IN FMA
FMA-571	Strait of Malacca and Andaman Sea
FMA-572	Western Indian Ocean of West Sumatera and Sunda Strait
FMA-573	Southern Indian Ocean, south of Java to the southern Nusa Tenggara, Sawu Sea, and western Timor Sea
FMA-711	Karimata Strait, Natuna Sea, and South China Sea
FMA-712	Java Sea
FMA-713	Makassar Sea, Gulf of Bone, Flores Sea, and Banda Sea
FMA-714	Gulf of Tolo and Banda Sea
FMA-715	Gulf of Tomini, Maluku Sea, Halmahera Sea, Seram Sea, and Gulf of Berau
FMA-716	Sulawesi Sea and northern area of Halmahera Island
FMA-717	Gulf of Cendrawasih and Pacific Ocean
FMA-718	Aru Sea, Arafura Sea, and eastern area of Timor Sea

Each FMA is overseen by a fisheries management council (FMC) (based on SK no. 47/KEP-DJ PT/2017). Each unit has a chairman (a representative from DG Capture Fisheries), an executive coordinator, and a secretariat. These FMCs are tasked with the development and implementation of an FMA fisheries management plan (*Rencana Pengelolaan Perikanan – RPP*) to ensure the area is sustainable and prosperous.

THE STRUCTURE OF A FISHERIES MANAGEMENT COUNCIL

Head: Chairman

Executive body: Executive coordinator and secretariat

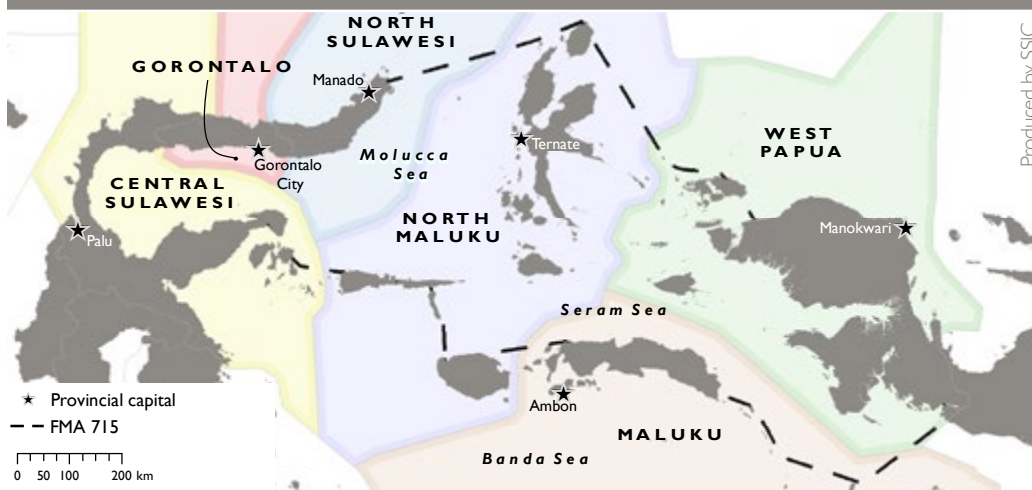
Member representatives:

- DG Capture Fisheries – all directorates
- The center for data, statistics, and information under the MMAF (PUSDATIN)
- The human resource agency of the MMAF (BRSDM)
- Surveillance stations under PSDKP
- Provincial Marine and Fishery Agency (DKP)
- Technical implementing units (UPTs) in each province
- Academic institutions
- Non-governmental organizations
- Fishing associations
- Fishery processing associations
- Local community groups

Given the large size and scale of each FMA, further sub-FMA plans for specific localized fisheries and stocks may also be developed that align with the overall strategic goals of the FMA. Conversely, where FMAs are smaller than the range of particular fishery stocks (i.e. species that can travel great distances during their lifecycle, such as tuna), national management plans are anticipated to complement and bring together FMA considerations for a coherent management approach.

At the national level, these FMCs are supported by three working groups, a scientific panel, a consultative panel, and a range of advisors.

PROVINCES OF FISHERIES MANAGEMENT AREA (FMA) 715



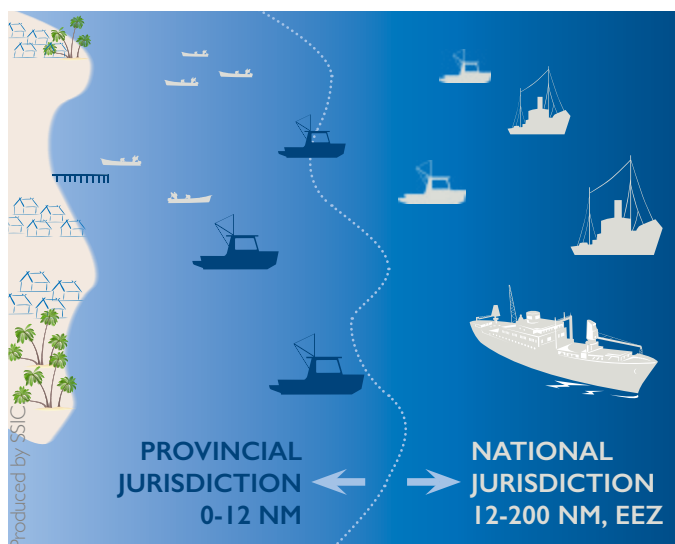
PROVINCIAL GOVERNANCE

There are 34 provincial jurisdictions in Indonesia, overseen by a provincial governor and staffed by departmental civil servant representatives.

Based on law no. 23/2014, each province is responsible for managing their marine and coastal waters, extending seaward 12 nautical miles (nm) from the shoreline. Beyond 12 nm has always been, and remains, under the jurisdiction of the national government.

These responsibilities are relatively new for provinces. Between 1999 and 2014, through a process of decentralization, jurisdiction over coastal waters had been divided between district governments (0–4 nm) and provincial governments (4–12 nm). However, in 2014, the newly enacted law (no. 23) effectively partially recentralized authority, placing the control of coasts and marine areas from 0 to 12 nm entirely under provincial jurisdiction.

Many regional FMAs cover multiple provincial jurisdictions. Therefore, where an FMA encompasses the waters of several provinces as well as national waters, the different provincial and national governments are anticipated to work together through the FMC, to achieve the sustainable management of the area.



Far right: coastal and marine areas up to 12 nm from shore fall under provincial jurisdiction

THE IMPACT OF PARTIALLY RE-CENTRALIZING MARINE & COASTAL GOVERNANCE

The introduction of law no. 23/2014 has had a considerable impact on the management of marine and coastal resources in Indonesia, as areas formerly governed by district governments transitioned to provincial oversight.

To ensure the new governance system can be well executed, the MMAF is producing a range of norms, standards, procedures, and criteria documents (*Norma, standar, prosedur dan kriteria – NSPK*) detailing the mechanisms to implement good governance at the provincial level. These NSPKs (in development at the time of writing) cover a range of marine and fisheries management issues and serve as guidelines to support provinces across the country to manage their new responsibilities. Topics covered include marine spatial management, the management of aquaculture, capture fisheries, post-harvesting fish handling, fishery marketing, and area surveillance.

At the same time, in each province across the country, all the management of personnel, financing, infrastructure, and documentation previously governed by districts (collectively referred to as *Personil, Peralatan, Pembiayaan dan Dokumen – P3D*) are being transitioned to the provinces. This transfer process (also underway at the time of writing) is complex and critical. The process determines the technical operations for the future and dictates the level of resources available to enable provincial governments to function as mandated by the law.

Completion of the P3D process also enables access to a de-concentration fund (*Dana Dekonsentrasi*) and task assist fund (*Tugas Pembantuan*) to support marine and fisheries management financing at the provincial level. These funds may then be allocated as required to form the basis of collaborative management systems between provinces, districts, and even sub-districts and villages.



CTC

The USAID SEA Project has been working at both the national and provincial levels to support the transition of authority process. Support has included: (1) strategic inputs on the technical steps needed to complete the P3D process, (2) undertaking assessments and collating technical background information to support provincial government decision making, and (3) supporting the liaison required between provincial governments, the MMAF, the Ministry of Home Affairs, and the National Personnel Agency (*Badan Kepegawaian Nasional – BKN*). The project has also provided facilitation support and capacity building for all key relevant practitioners involved in the transition as well as support in NSPK development.



B KAHN



Above: artisanal fisherman

Below: a typical harbour in eastern Indonesia

DISTRICT & COMMUNITY GOVERNANCE

Within the 34 provinces of Indonesia, there are a combined total of 515 districts / regencies / municipalities (*kabupaten / kota*), 6,487 sub-districts (*kecamatan*), and more than 76,000 villages (*desa*). Municipalities are overseen by a city head / mayor (*Walikota*). Districts are overseen by a district head (*Bupati*), and district offices operate under bupati leadership, though they reflect and retain affiliation with central government departments.

Since the enactment of law no. 23/2014, responsibility for marine and coastal management no longer lies in the hands of this district administration. However, for practical hands-on management purposes, provincial governments are expected to work closely with and delegate some levels of responsibilities to district offices. This is important because in Indonesia, since most provinces cover a large geographical area. Therefore, the most effective level of government to support the management of coastal and marine resources is at the district and village levels where people are directly dependent on, and can influence, their marine areas and fisheries.



CTC / M WELLY



USAID SEA / I R. TARMIDJI



Above: traditional house in Maluku

TRADITIONAL GOVERNANCE SYSTEMS

In some areas of Indonesia, there are also a range of traditional marine governance practices at the local community level. These systems have a critical role to play in marine governance and are based on customary practices that, in some cases, have been in existence for hundreds of years. Often, these practices are established by community leaders and endorsed by local spiritual (*adat*) leaders.

While these systems are not always formally recognized under the law, adherence to – and understanding of them – is deeply embedded in cultural identities locally and respected nationally. There are also movements within the country to more formally recognize these efforts, and in some areas the practices have been recognized and formalized already through local regulations (district decrees). Traditional marine governance systems include the following:

Sasi

Generally occurring in eastern Indonesia, this system implements temporary closure of particular areas to fishing or extraction. This is to enable the ecosystem and associated fishery species to regenerate. In the past, *sasi* was used to build up resources in time for particular community activities (such as festivals or feasts), to ensure a maximally productive harvest was available when the area was reopened just prior to the event.

Closures could be implemented for periods lasting from a few months to a few years and were generally intended to promote regeneration of nearshore sessile species, such as clams, sea cucumbers, and trochus (top shells).

In recent decades, this tradition has diminished, but has been re-galvanized in several areas through the support of local conservation groups, with some sites being established as permanent *sasi* closures to promote long-term regeneration and biodiversity conservation (ADB, 2014).



J MORGAN

Panglima laot

Existing in Aceh, in the far west of Indonesia, this traditional institution has the customary mandate to guide the livelihood activities of fishers. Operational since the 17th century (Soesalit, 2015), the term literally translates as ‘sea commander’ in Acehnese, and the head of *Panglima laot* in an area serves as a liaison between fishers and government representatives. The institution also works to settle any disputes between fishers and promotes agreed-upon practices for the betterment of fishers’ livelihoods and wider society.

Mane’e

This system has been practiced in some parts of North Sulawesi for hundreds of years. *Mane’e* is an agreement between fishers to prohibit fishing in key areas, usually for one year (Reppie *et al.*, 2007). It is a deeply bound tradition under ‘*eha*’ (local regulation), established through local *adat* institutions. When fishing is permitted, it takes place during low tide, with fishing gear made from roots and coconut leaves, prepared by the whole community as a sign of respect for the ocean (Mandagi, 2016; Reppie *et al.*, 2007).

Awig-awig

This is practiced in areas of Lombok and Bali. *Awig-awig* is a customary arrangement for developing local *adat* (spiritual) regulations governing resource use and conflicts. It is said to promote the harmony of relationships between people and with God (Semadi, 2015). Through *awig-awig*, communities can come together to agree on issues of access and other governance frameworks for managing their marine and coastal environment.

In addition to the above community-based practices, a considerable number of local activist organizations and civil society groups exist across Indonesia, supporting and promoting sustainable marine and coastal management. These range from local dive shops supporting monitoring efforts to waste management groups tackling water-based pollution.



K AZIS

MANAGEMENT ACTIONS FOR SUSTAINABILITY

A wide range of management actions are implemented through the aforementioned governance frameworks at the national, regional, provincial, district, and community level in order to address the many and varied marine and coastal challenges facing Indonesia today.

Broadly speaking, these actions fall into the following categories and are covered in the following sections:

- marine spatial planning
- managing coastal developments
- managing pollution
- managing extraction and rehabilitation
- establishing marine protected areas
- managing fisheries
- enforcing the law
- changing societal behaviors
- building the skills needed for sustainability.



Above, left: Mooi elder in West Papua

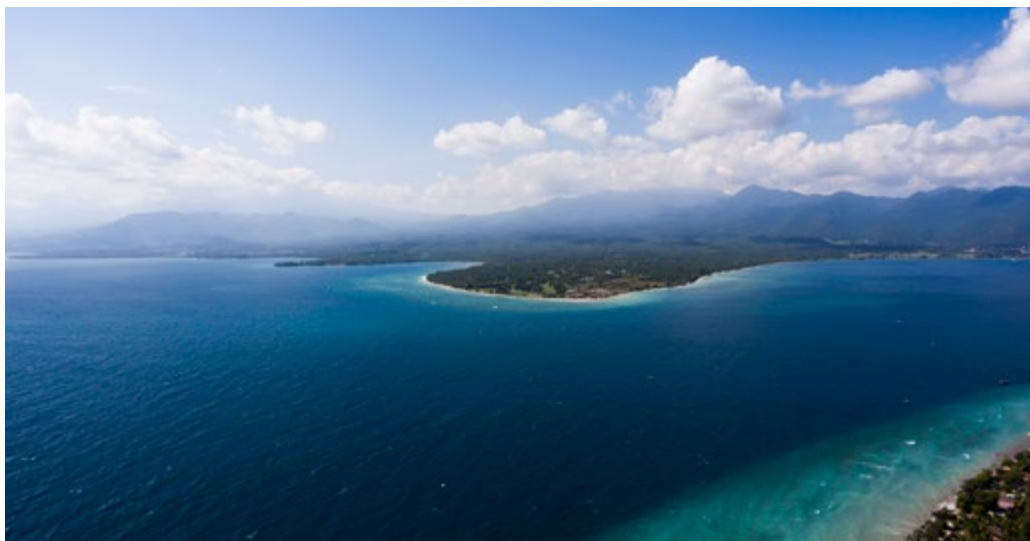
Above: Minister Susi Pudjiastuti with enthusiastic youth of Maluku

Over page: aerial view of hand line fisher boat



ACTION FRAMEWORK

MARINE SPATIAL PLANNING



DEPOSITPHOTOS.COM

Effectively managing coastal and marine resources requires understanding resource use practices in a region and designating which areas are appropriate (or not appropriate) for particular activities.

Therefore, spatial planning is an important governance tool, and in recent years, it is becoming a practice worldwide for nations to define and govern the use patterns of both land and sea.

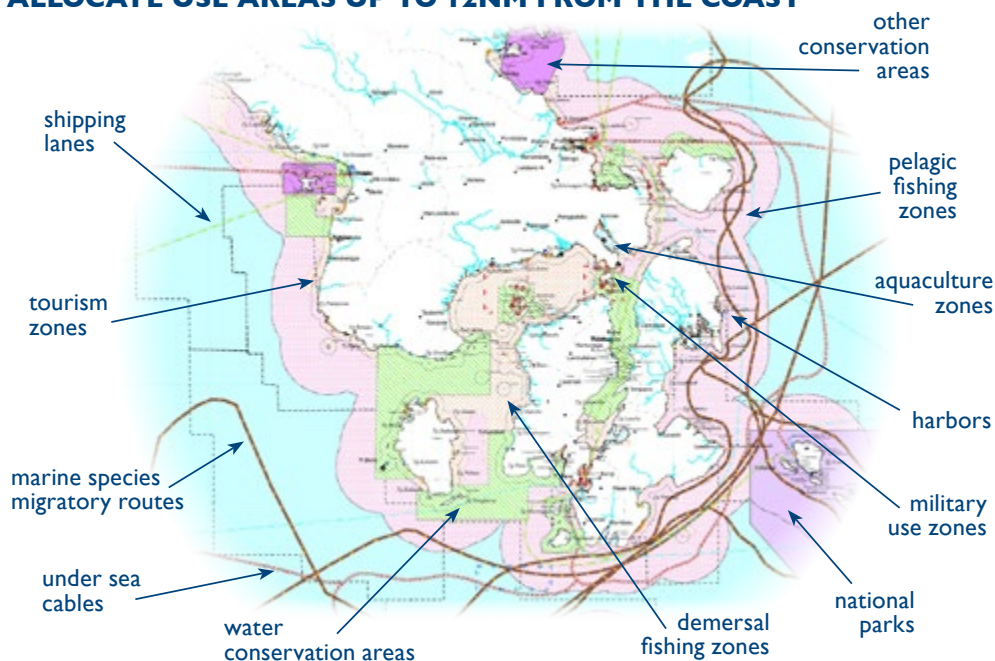
In Indonesia, **marine spatial planning** (MSP) is defined as “... a guiding plan to determine appropriate spatial utilization of water areas, developed with consistent provisions for spatial structures and patterns, and determining permissible activities, non-permissible activities, and activities permissible only with relevant licenses” (law no. 27/2007 and law no. 1/2014).

Since 2007, it has become the mandate of each province in Indonesia to produce marine spatial plans for their provincial waters (known as *Rencana Zonasi Wilayah Pesisir dan Pulau-Pulau Kecil* – RZWP-3-K, as stipulated under laws no. 27/2007 and no. 1/2014 on coastal and small islands management). This mandate was further endorsed in 2015 when the President of Indonesia launched the ‘National Movement for Saving Natural Resources’, which obliged all provincial governors in Indonesia to finalize their spatial plans and commit to their enactment at the highest level (through issuance of a *Peraturan Daerah* – regulation).

T SCHULTZ



PROVINCIAL MARINE SPATIAL PLANS (RZWP-3-K) IDENTIFY & ALLOCATE USE AREAS UP TO 12NM FROM THE COAST



CONSIDERATIONS:

- administrative boundaries
- transport infrastructure
- harbors, ports & jetties
- coastal infrastructure and facilities
- physical environment

USE AREAS:

- sea lanes areas
- conservation areas
- general use zones
- military areas

Note: planning considerations and use zones provided here are examples only and not intended to be exhaustive.

Source: Rencana Zonasi Wilayah Pesisir dan Pulau-Pulau Kecil Sulawesi Utara - Peta Rencana Alokasi Ruang. Produced by SSIC.

Development of these plans requires the collation and analysis of a considerable amount of physical and thematic data. This data is then spatially represented and overlaid onto 19 different maps. Using these maps, provincial governments and associated stakeholders (including representatives from district governments, academic institutions, NGOs, fisher groups etc., as relevant to the province) are able to assess potential areas of resource-use conflict, identify appropriate jurisdictions, and make trade-off decisions regarding acceptable (and unacceptable) activities at any given site.

In order to protect the rights and livelihoods of local fishers and communities, the law stipulates that each provincial plan should recognize existing customary laws and practices. This includes, where relevant, existing tenurial claims on marine waters.

The plans should also allocate some of the coastal waters, up to two nautical miles, for local small-scale fisheries (article 18, PerMen KP no. 23/2016). In these areas, local fishers are exempt from requiring a location or utilization permit, whereas outside fishers wishing to utilize the waters require both of these permits.

At the time of writing, approximately 15 percent of all provinces in Indonesia have completed and authorized their spatial plans. All remaining provinces are anticipated to have them completed by the end of 2018.



Above, left: aerial view of marine area

Left: marine spatial planning recognizes tenurial claims on marine waters

DATA REQUIRED FOR MARINE SPATIAL PLANNING

(Article 24, PerMen KP no. 23/2016)

Physical base data

- Provincial sea boundaries
- Coastlines
- Bathymetry data of the region

Thematic data

- Oceanography
- Sea geomorphology and geology
- Coastal and small island ecosystems
- Pelagic and demersal fish resources
- Utilization of existing marine spatial areas
- Documented existing planned use of coastal water utilization
- Social, economic, and cultural factors
- Disaster risk mitigation

SPATIAL REPRESENTATION OF DATA (19 MAPS)

The following are required by MMAF (circulation letter no. I53/PRL.I/III/2017) on the simplification of RZWP-3-K maps.

- | | | |
|---|--|---|
| (1) Map of the provincial planning area | (8) Map of chlorophyll distribution | (12) Map of demersal fishing grounds |
| (2) Map of the spatial structures and patterns for RZWP-3-K | (9) Map of the existing spatial use of coastal water and small island areas | (13) Map of pelagic fishing grounds |
| (3) Bathymetry map | (10) Map of the existing utilization of coastal water and small island areas | (14) Map of traditional fishing grounds |
| (4) Sea base substrate map | (11) Map of coastal ecosystems (coral reef, seagrass, and mangrove) | (15) Disaster risk map |
| (5) Wave map | | (16) Water clarity map |
| (6) Current map | | (17) pH map |
| (7) Map of sea surface temperatures | | (18) Salinity map |
| | | (19) Spatial zoning allocation map. |

Final spatial plans are required to outline four major spatial use categories (article 20, PerMen KP no. 23/2016):

- | | | |
|------------------------|---------------------------------------|-----------------------|
| (1) conservation areas | (2) specific national strategic areas | (3) general use areas |
| | | (4) sea lanes. |



Right: marine spatial planning includes designated tourism zones

Over page: coastal stilt village in Sulawesi

ZONE CATEGORIES FOR FINAL SPATIAL PLANS

- (1) Conservation areas are set aside specifically for marine conservation purposes and may include:
 - coastal and small island conservation areas
 - maritime conservation areas
 - marine protected areas.
- (2) Specific national strategic areas are significant sites from a national security or sovereignty perspective and may include:
 - maritime borders with neighboring nations
 - state defense and security zones
 - world heritage sites
 - zones for nationally relevant conservation areas.
- (3) General use areas, may include:
 - tourism zones
 - aquaculture fishery areas
 - energy zones
 - settlement zones
 - salt production zones
 - areas of public facilities
 - ports
 - industry use zones
 - other sea utilization zones in accordance with the bio-geophysical characteristic of the environment (with the exception of energy utilization).
 - mangrove forest areas
 - coastal airports
 - mining areas
 - seaplane landing areas
 - areas of importance for capture fisheries
 - service and trade zones
- (4) Sea lanes refer to corridor zones for shipping, underwater infrastructure development (such as cables and pipes) and lanes identified as important for marine biota migrations.

The USAID SEA Project has been supporting these efforts in three provinces in eastern Indonesia – North Maluku, Maluku, and West Papua – by providing intensive technical assistance for the development of their spatial plans (see more details on the support provided in SOTS volumes two and three). At the same time, the project, in collaboration with the National Oceanic and Atmospheric Administration (NOAA), has been providing capacity-building support to the MMAF at the national level, to strengthen institutional frameworks and procedures for securing MSP implementation, monitoring, and evaluation.

WWF / Z. ARIFIN





ACTION FRAMEWORK

COASTAL

DEVELOPMENT



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The marine spatial planning process (described in the previous section) is an important step in helping provincial governments identify which areas of their coastal environment are appropriate (or not appropriate) for development. However, as coastal developments intersect both with the land and sea, their management requires consideration of both coastal regulations and land management regulations. Land spatial planning has been regulated in recent years under law no. 26/2007 and it falls under the remit of the Ministry of Public Works and Housing (*Kementerian Pekerjaan Umum dan Perumahan Rakyat – KPUPR*). Similar to marine spatial plans, land use plans are required for each province (*Rencana Tata Ruang Wilayah Provinsi – RTRWP*), drawn up to a scale of 1:250,000. Individual villages can also identify areas within their boundaries for particular developments (under law no. 6/2014), which are then included in village development plans and reflected within the overall provincial plans.

ENVIRONMENTAL IMPACT ASSESSMENTS

Within the various development areas identified in the spatial plans, Indonesia's environment law (PerMen no. 05/2012) stipulates that full environmental impact analyses (*Analisis Mengenai Dampak Lingkungan – AMDAL*) are required for certain types of developments and activities.

These assessments need to take into consideration:

- the size of the population potentially affected by the development / activity
- the scale of the area impacted
- the intensity and duration of impact
- the number of environmental components potentially affected
- the cumulative nature of the impact
- the reversibility (or irreversibility) of the impact
- the technological capabilities available to cope with any significant impacts that may arise
- other criteria dependent upon the availability of science and technology.



Above: cargo harbor in Jakarta

MARINE AND COASTAL DEVELOPMENTS REQUIRING FULL ENVIRONMENTAL IMPACT ASSESSMENTS (AMDALs)

In marine and coastal areas, environmental impact assessments are required for the following developments and activities:

- any reclamation of coastal or small island areas that: (1) covers an area ≥ 25 ha, and/or (2) will have a volume of soil added that is $\geq 500,000$ m³, and/or (3) covers an area ≥ 50 m perpendicular to the shoreline
- any fishery aquaculture operation that uses advanced or medium technologies (with or without a processing unit) that: (1) covers an area ≥ 50 ha, and/or (2) has more than 1,000 floating nets or pen systems (or where the floating pens themselves cover an area ≥ 5 ha)
- any dredging activity that extracts a volume $\geq 500,000$ m³ and/or dredges an area ≥ 5 ha. Where dredging requires the use of explosive materials, all scales require an environmental impact assessment
- any port-based construction using sheet or open-pile infrastructure that has a length ≥ 200 m and/or covers an area $\geq 6,000$ m²
- any large-scale port construction
- any construction causing tidal or wave barriers that are ≥ 200 m in length
- any floating facility that is $\geq 10,000$ dead weight tonnage (DWT)
- any industrial shipyard with a docking area of $\geq 50,000$ DWT
- any public works infrastructure on beaches or river mouths that cover an area ≥ 500 m perpendicular to the shoreline
- all coal (or solid fossil fuel) mining operations at sea require an AMDAL, as do any operations involving submarine-based placement of tailings (mining products)
- any marine-based petroleum mining activities that generate $\geq 15,000$ barrels of oil per day
- any gas mining activities extracting ≥ 90 million standard cubic feet of gas per day (MMSCFD)
- any submarine petroleum, natural gas, or oil piping that is ≥ 100 km in length and/or has a pressure or ≥ 16 bar
- any liquid petroleum gas (LPG) refinery construction handling ≥ 50 MMSCFD
- any liquid natural gas (LNG) refinery (or regasification terminal) handling ≥ 550 MMSCFD
- any oil refinery handling $\geq 10,000$ barrels of oil per day
- any scale tourism area (*kawasan pariwisata*)
- any recreation park (*taman rekreasi*) covering an area ≥ 100 ha.

(Appendix 1, PerMen No.05/2012)

In addition to this, any project located at a national border or inside a protected area, no matter the type or scale, requires an AMDAL (Priatna et al., 2010).



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AMDALs are required to be undertaken by suitably trained and registered experts, certified by the Indonesian Institution for Competence Certification, which is approved by the Minister of Environment and Forestry (ADB, 2012a). Under the law, the AMDAL process requires public participation, and all AMDAL plans need to be publicly announced, so that citizens can lodge any concerns against the development. AMDALs take an average of 6 to 12 months to complete and are then evaluated by the AMDAL Evaluation Commission (*Komisi Penilai*). This leads to the issuance of an **environmental license** that stipulates the environmental mitigation efforts a development must comply with, as recommended by the evaluation commission.

The development owners must then:

- comply with the terms and conditions of the license
- produce a mandatory annual environmental management plan (*Rencana Pengelolaan Lingkungan Hidup – RKL*) and environmental monitoring plan (*Rencana Pemantauan Lingkungan Hidup – RPL*), which are submitted to the provincial environment office (*Badan Lingkungan Hidup*) for review and approval
- provide collateral funds for any potential environmental restoration.

Breach of an environmental license may result in sanctions against the development, including written warnings, suspension or revocation of the business license, and enforced cessation of all activities. A breach may also give rise to civil and criminal penalties (Heath, 2014; MPWH RI, 2015).

Smaller coastal developments, where the design suggests a more minimal impact on the environment, do not need to undertake a full AMDAL,





COMMONS

but may still be required to identify environmental management measures (*Upaya Pengelolaan Lingkungan Hidup – UKL*) and provide information on the environmental monitoring measures (*Upaya Pemantauan Lingkungan Hidup – UPL*) implemented (PerMen no. 10/PRT/M/2008). Some coastal developments are also required to undertake an environmental risk analysis (*Analisis Risiko Lingkungan Hidup – ARLH*), outlining risk assessment, risk management, and communication around risks when developing an area (law no. 32/2009). In some cases, a strategic environmental assessment (*Kajian Lingkungan Hidup Strategis – KLHS*) may also be required, particularly in areas of high conservation value.

Therefore, it is clear that a range of systems are in place that give decision makers the opportunity to assess the potential impacts of a development and the freedom to block developments that are anticipated to be severely degrading to marine and coastal habitat. However, to date there have been very few high-profile cases that have not proceeded on environmental grounds or have faced any suspension or repercussions for failing to comply with their environmental license (Heath, 2014).

In the coming years, it will be critical to strengthen these processes for marine and coastal developments to ensure the systems available effectively promote sustainable coastal developments

and meet the needs not only of the developers, but of the nation's people.



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Above, left: port construction can have significant environmental impact

Far left: tourism development

Above: sustainable coastal development safeguards the livelihoods of the nation's people

Left: small-scale fish cage aquaculture development in Maluku

Over page: marine pollution in Halmahera



ACTION FRAMEWORK

MARINE

POLLUTION



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Indonesia has been aware of the challenge of marine pollution since the 1970s. Despite efforts to address this challenge over the decades, the problems have persisted and have become increasingly urgent.

Indonesia is a signatory to several major international treaties committed to addressing pollution, including marine pollution.

INTERNATIONAL POLLUTION-RELATED CONVENTIONS TO WHICH INDONESIA IS SIGNATORY

The International Convention on Civil Liability for Oil Pollution Damage (1969, ratified 1978)

The International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (1971, rat.1978)

United Nations Convention on the Law of The Sea (UNCLOS) (1982, rat. 1985)

ASEAN Agreement on the Conservation of Nature and Natural Resources (1985, rat. 1986)

Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships (amended from 1973)

The International Convention for the Prevention of Pollution from Ships (MARPOL – 1986)

Basel Convention for the Control of Transboundary Movement of Hazardous Waste and Disposal (1989, rat. 1993)

Protocol of 1992 to Amend the International Convention on Civil Liability for Oil Pollution Damage (1969, rat. 1999)

Cartagena Protocol on Biosafety to the Convention on Biological Diversity (2000, rat. 2004)

Stockholm Convention on Persistent Organic Pollutants (2009)

International Convention on Civil Liability for Bunker Oil Pollution Damage (2001, rat. 2014)

International Convention for the Control and Management of Ships' Ballast Water and Sediments (2004, rat. 2015)



Above: beach pollution in Bali

Above, right: beach clean-up activity in North Maluku

Right: without waste management facilities in coastal towns, many people dump their waste directly into the sea, like this woman in Labuan Bajo, Flores

Right, middle: plastic pollution and oil covering the sea surface



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MDPI



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These international frameworks set out broad legal principles for tackling marine pollution. Building on these frameworks, Indonesia has passed a range of laws and regulations nationally. One of these is the 1999 marine pollution and contamination control regulation (no. 19/1999), prohibiting anyone from taking any action that causes marine environmental pollution (article 9) and requiring a permit for dumping any waste in the sea (article 18). More recently, law no. 32/2009 on the

protection and management of the environment furthered this by stipulating criminal sanctions (articles 97–120) for individuals and corporations committing acts that cause environmental pollution and/or damage (Taufan, 2017).

In 2014, the Law of the Sea (no. 32/2014) was established as an umbrella law for marine-related activities, under which responsibility for protecting and conserving the marine environment (through the prevention, reduction, and management of ocean pollution) was clearly placed with central and regional governments (articles 55 and 56).

However, despite these advances, until recently few concrete measures have been taken for preventing pollution or penalizing polluters, and regulatory specificity for tackling the challenge remains limited (Taufan, 2017). The problem is particularly severe in coastal areas adjacent to large towns and cities, where the vast majority of pollutant waste is created. Many of these areas remain without adequate municipal waste management systems, resulting in both household and industrial waste oftentimes ending up in the ocean. The largest tangible efforts tackling marine pollution to date have come from citizen activists, community groups, and NGOs. Such groups are leading the battle against pollution through clean-up events and educational programs.



CTC / Y PUTRA

In recent years, these citizen-led activities have been effective at galvanizing action at a range of levels, particularly targeted at plastic pollution. In response, the government trialed a tax on single-use plastic bags in 23 cities across Indonesia in 2016. A draft regulation was also developed to permanently impose a nationwide tax of not less than Indonesian Rupiah (IDR) 200 per plastic bag (Langenheim, 2017). This trial initiative considerably reduced the use of plastic bags, but also met with significant resistance both from consumers and industry, which (at the time of writing) have led to delays in passing the regulation.

Nonetheless, efforts have continued and have been scaled up in recent years. In February 2017, Indonesia joined the UN's new Clean Seas campaign (along with nine other countries), with the aim of tackling consumer plastics through a range of actions – from cutting down on single-use plastics (such as shopping bags and coffee cups) to pressuring firms to cut down on plastic packaging (Wright, 2017). As part of this commitment, **the government announced it will pledge one billion USD to curb ocean waste by 70 percent by 2025 and work toward a plastic-free future.**

This is an ambitious target and one that will require support from all levels of government and society. The pledge includes proposals to facilitate and encourage new industries that use biodegradable materials (such as cassava and seaweed) to produce plastic alternatives as well as moving past obstacles to implement the nationwide tax on plastic bags. The funds will also be used to implement a sustained public education campaign.

Many government and civil society leaders are welcoming this move, with some actively shaping change. This includes the Governor of Bali province, who has made a commitment to make the island plastic bag-free by the end of 2018 (Langenheim, 2017).

However, plastics are not the only marine pollutants that need to be addressed, and the pollution challenge requires tackling at a range of levels (from production to waste management systems). Taking a holistic approach, an Indonesia waste platform (IWP) collaboration began in 2016. The IWP (www.indonesianwaste.org) aims to bring together the private sector, the media, academic institutions, local and international NGOs, as well as community and religious leaders from across the country, in an effort to promote cross-sector collaboration, facilitate waste business development, and promote shared strategies and action plans for waste management. IWP works in collaboration with the Coordinating Ministry for Maritime Affairs and the Ministry of Environment and Forestry.



Above: plastic bags floating in the sea in Maluku

ACTION FRAMEWORK

HABITAT

EXTRACTION

& MARINE

REHABILITATION



DEPOSITPHOTOS.COM

As outlined in the previous section on threats, marine habitats are exploited and harvested for a range of reasons. Corals are harvested to produce limestone and construction materials. They are gleaned to make handicrafts, such as jewelry and souvenirs, and are used in the pharmaceutical industry (for bone graft material and the manufacture of calcium supplements). Mangroves are felled to provide firewood, charcoal, construction materials, and as source material for dye production and handicrafts. Such extractive practices lead to the loss of these critical habitats and the associated ecosystem goods and services they provide.

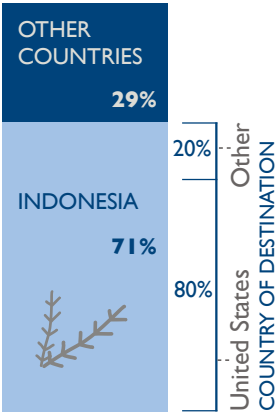
- Above: live corals are exported for the aquarium trade
- Above, right: limestone powder is produced from harvesting and breaking up corals
- Below, right: corals are harvested to sell as souvenirs

ADDRESSING CORAL EXTRACTION

As far back as 1982, the Governor of Bali island in Indonesia banned the mining of corals through local regulations, with some other provinces following suit in the subsequent years. However, enforcement of these provincial-level bans has always been and remains challenging. This is particularly the case where coral extraction activities for local use are taking place in remote, small communities. There is also a lack of awareness amongst coastal communities of the impacts of localized coral harvesting, and more efforts are required to generate a greater understanding of these impacts throughout society.

In more recent years, harvesting corals in some designated areas has become permissible under license, and they are sold, alive, to the booming marine aquarium industry. This industry has grown to such an extent that Indonesia now provides 71 percent of the world's exported live coral (totaling nearly two million tons annually), the vast majority of which (80 percent) goes to the United States (CORAL, 2005). This export industry is managed by species-specific quotas on all live corals to be exported and

LIVE CORAL EXPORT PRODUCERS





USAID SEA / I. R. TARMIDJI

through a licensing system implemented since the late 1990s under the umbrella framework of Indonesia's ratification of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Export of recently killed corals for the international curio trade has also been banned in Indonesia since the late 1990s.

While these restrictions on exports go some way to regulating the scale of extraction and sale of harvested corals, more work is required to ensure licensing schemes place greater responsibility on the extractors to comply with sustainable management practices. Enforcing regulations concerning the export of live corals is difficult; coral harvesting is also plagued by confusion among government customs agents about what is a coral (live or dead). Most other countries have simply banned the export of corals altogether, in recognition of the very high value they have by remaining alive and healthy in their native habitats.



DEPOSITPHOTOS.COM

Therefore, greater levels of awareness and education are required across all sectors to recognize the negative impacts of this trade (at both the producer and consumer level) and explore alternative livelihood options for those engaged in this industry.



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ADDRESSING MANGROVE EXTRACTION

Like coral extraction, harvesting mangroves is regulated under the law, but enforcement remains challenging. Under the Forestry Act (no. 41/1999), felling mangroves (or any coastal trees) is not permitted within a specified distance from the shore. This area is defined in the legislation as “130 times the difference of the highest tide and the lowest tide from the shoreline” (article 50, 3.c.6). In other words, the tidal range must first be calculated, and then multiplied by 130 times before calculating how far from the shoreline felling is permitted. This rather obscure distance reference is intended to recognize the differences between coastal habitats with large and small tidal ranges. However, the difficulties of interpreting this regulation on the ground makes compliance and enforcement challenging.

In addition to this, it is prohibited to fell trees, harvest, or collect forest products without an appropriate license (article 50, 3.e), or to accept, buy, or sell any forest products that may have been unlawfully extracted (article 50, 3.f). It is even illegal to be found carrying tools that are commonly associated with cutting and felling trees without appropriate authorization (article 50, 3.k).

In 2012, the law protecting mangroves was further strengthened by Presidential Regulation no. 73/2012 outlining the national strategy for mangrove ecosystem management (*Strategi Nasional Pengelolaan Ekosistem Mangrove – SNPEM*). This regulation requires all districts and provinces in Indonesia to establish a SNPEM coordination team and associated working group to oversee mangrove management in their jurisdictions (articles, 9, 10, and 11).

In 2015, the Ministry of Environment and Forestry (MEF) formalized the process of geospatially mapping mangroves across the country through a ‘One Mangrove Map’ program (under KepKaBIG no. 54/2015). To date, mangroves have been mapped in Java, Sumatra, Sulawesi, Bali, and Nusa Tenggara, with mapping currently underway in the Maluku islands (at the time of writing) and planned for Kalimantan and Papua in the coming years. The data gathered for these



DEPOSITPHOTOS.COM

maps will be used to track levels of utilization and degradation more effectively over time and target response actions to appropriate geographies (KLHK, 2017a).

In April 2017, the MEF hosted an international mangrove conference in partnership with the International Timber Trade Organization (ITTO) and the International Society for Mangrove Ecosystems (ISME). This resulted in an agreement to further strengthen good governance and law enforcement for mangrove ecosystems, establish a moratorium on mangrove logging, promote payments for ecosystem services (PES) related to mangroves, and undertake the necessary research and education required for sustainable mangrove management (KLHK, 2017a). Furthermore, the DG of Watershed Control and Protected Forest announced plans to develop a national strategy for mangroves in coordination with relevant agencies and a commitment to set aside 10 percent of available corporate social responsibility (CSR) funds to support mangrove rehabilitation activities (KLHK, 2017a; KLHK, 2017b).



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Top left: mangroves being cut for firewood

Above: mangrove seedlings ready for replanting

Left: proximity to human settlements makes mangroves vulnerable to extraction



J MORGAN



CTC / M WELLY

Top: reef rehabilitation program
'Biorock' in Gili Islands

Above: platygyra coral in
North Maluku

REHABILITATING MARINE & COASTAL HABITAT

Marine and coastal habitat rehabilitation and restoration work is taking place throughout Indonesia using a range of mechanisms, as detailed below.

- Coral reef restoration efforts have been undertaken in various locations across the country. Methods have involved simple techniques such as coral transplantation (taking corals from a healthy area and transplanting them to damaged areas), as well as more advanced experimental techniques, such as the electrical stimulation of corals, which promotes chemical accretion processes and speeds coral growth (though it is thought to potentially weaken corals). Other methods involve installing substrates in damaged areas that encourage coral resettlement (e.g. artificial reef structures or reef ball installations).
- Seagrass restoration has been attempted using seagrass transplantation, but has had limited trials and roll-outs to date, predominantly undertaken by only two groups: the Indonesian Institute of Sciences (LIPI) and the Seribu Islands Marine National Park (TNKS).
- Mangrove restoration efforts have been implemented throughout Indonesia, starting as far back as the late 1980s. The MEF led a forest and land rehabilitation program that involved planting nearly 800,000 seedlings (from 2005–2009) and restored more than 175,000 ha of mangrove forests. Following this, a 'One Man One Tree' program was implemented by the government together with local communities, resulting in the replanting of 98.3 million trees in conservation and mangrove areas. In addition to this, numerous NGOs, community groups, and private corporations (as part of their CSR efforts) have undertaken mangrove rehabilitation work in Indonesia.

ACTION FRAMEWORK

ESTABLISHING

MARINE

PROTECTED

AREAS



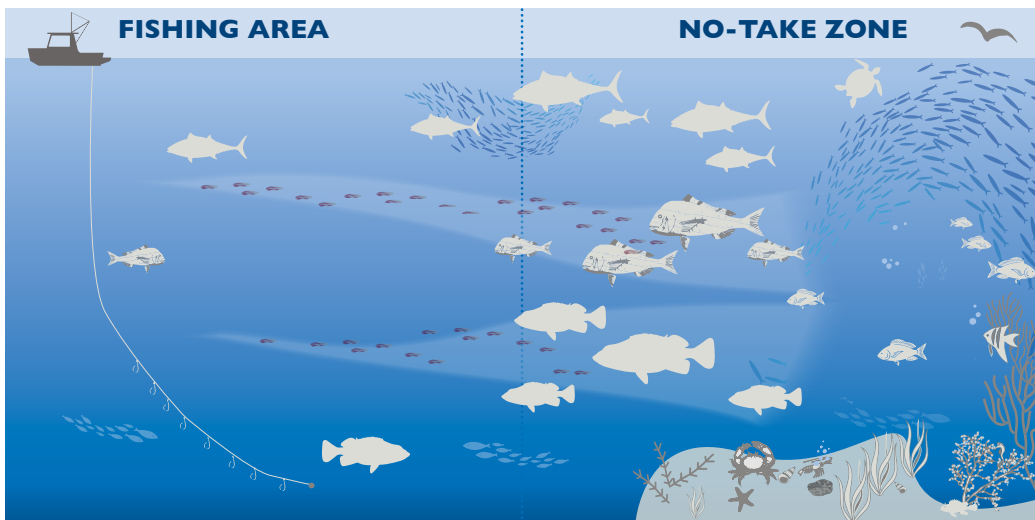
The creation and effective management of MPAs has globally proven to be an effective approach to maintaining and enhancing marine biodiversity, particularly in areas of coral, seagrass, and mangrove ecosystems.

MPAs also serve to protect fish habitats and increase the productivity of fisheries. When designed appropriately, MPAs include **no-take zones (NTZs)**, where fishing or extractive uses are entirely prohibited. In these areas, fish can grow to maturity and spawning aggregations are protected. This in turn builds fish biomass to the extent that it spills over into neighboring fishing areas, re-stocking the seas for increased fishery yields.

The MMAF carries out its mandate to establish and manage MPAs through the Directorate of Marine Conservation and Biodiversity (*Konservasi dan Keanekaragaman Hayati Laut – KKHL*) and Directorate of Coastal and Small Islands Utilization (*Pendayagunaan Pesisir dan Pulau-Pulau Kecil - P4K*) under the Directorate General for Marine Spatial Management (*Pengelolaan Ruang Laut – PRL*).



Above: installing a marine protected area location marker in West Papua



Source: WWF, 2015. Produced by SSIC.

MPAs IN INDONESIA

1982 Government declares intention to protect 10 million ha of marine habitat by 2010.

1984 Detailed plan and criteria for MPAs developed (prepared by DG of Forest Protection and Nature Conservation, IUCN and WWF). 180 potential sites identified.

1990 Act no. 5/1990 provides legal basis for designation and management of MPAs.

1993 National Biodiversity and Strategic Action Plan (NBSAP) produced. Goal for marine habitat protection expanded to 20 million ha.

2007 50 nationally designated MPAs established under the Ministry of Forestry, covering a total area of ~2.8 million ha (7 Marine National Parks, 8 Marine Strict Nature Reserves, 19 Marine Recreational Parks, and 5 Marine Wildlife Reserves).

2009 The President of the Republic of Indonesia, H.E. Dr. Susilo Bambang Yudhoyono announces commitment to expand MPA coverage to 20 million hectares by 2020.

Indonesia's National Plan of Action under the Coral Triangle Initiative explicitly recognizes the importance of effective management in MPAs (goal #3, action #9).

2010 More than 150 MPAs established, covering an area of >17 million ha. Responsibility for MPAs begins to be transferred to the MMAF.

2012 Technical guidelines for evaluating the management effectiveness of aquatic, coast, and small island conservation areas produced by the MMAF (E-KKP3K) through decree Kep no. 44/KP3K/2012.

2017 The MMAF makes a further commitment to expand MPA establishment to 30 million ha by 2030 (Surat no. 1612/PRL.5/VIII/2017, KKP). 165 MPAs recognized under MMAF, located in 32 provinces and 105 districts.

Sources: Carter et al., 2011; Dit. KKL, 2013; Suraji et al., 2015; UNEP-WCMC, 2008.

THE PROCESS FOR CREATING NATIONALLY RECOGNIZED MPAs IN INDONESIA

The steps required to design, develop, establish, and effectively manage an MPA are outlined in a guide (*Pedoman*) published by the MMAF. In general, the steps are as described below.

- Once an area has been identified as potentially suitable for MPA establishment, a decree is issued that informally outlines the (draft) outer boundary of the MPA. This is then included in the region's spatial plan as a conservation zone.
- Studies are required to establish an ecological baseline for the MPA and understand the biophysical and socioeconomic considerations necessary for MPA design and development.
- Extensive consultations are required with a wide range of stakeholders, from cross-sectoral government agencies to community groups, fisher associations, private sector representatives, and other vested interest individuals and groups. Information is collated and submitted to support the nomination and endorsement of the MPA.
- A process is required to establish an appropriate management body, release budget, acquire staff, establish offices, purchase equipment, etc. Under the new provincial governance framework, this is currently achieved through a decision statement (Surat Keputusan – SK) from the provincial governor.
- The detailed design and development of the MPA, including design of the different use and access zones, considers many factors and usually requires further studies and consultations, culminating in the production of an MPA management plan that includes a zoning plan.
- In order to endorse the MPA at the national level, a ministerial regulation (PerMen) is required, and the MPA is recognized within the national protected areas system.



J MORGAN

EFFECTIVELY MANAGING MPAs

Whilst formally establishing MPAs is one important step toward the sustainable management of marine and coastal ecosystems, unless those MPAs are effectively managed, they risk existing as paper parks only, without real protection on the ground or in the water.

MPA management effectiveness is the degree to which management actions achieve the stated goals and objectives of an MPA (Hockings *et al.*, 2000; Hockings *et al.*, 2006). In all MPAs, a range of biophysical, socioeconomic, and governance factors can directly or indirectly influence the overall management performance of the MPA; these need to be explored, understood, and adaptively managed in order for the MPA to operate effectively (Parks *et al.*, 2006).

The government of Indonesia has recognized the importance of MPA management effectiveness (White *et al.*, 2014). In its National Plan of Action (NPoA) under the Coral Triangle Initiative (CTI) agreement (action 9) produced in 2009, there was a commitment to “develop and adopt appropriate methods, standards, criteria, and indicators for evaluating the effectiveness of MPA management and governance” and to “implement management effectiveness evaluations for at least 30% of existing MPAs in Indonesia” (CTI, 2009: 22).

To that end, in 2012, the MMAF produced ‘Technical guidelines for evaluating the management effectiveness of aquatic, coasts and small islands conservation areas’, referred to as E-KKP3K (PerDirjen Kep no. 44/KP3K/2012). These guidelines build on existing nationally and internationally recognized effectiveness guidelines and assessment protocols, and are tailored and adapted to the Indonesian context (Carter *et al.*, 2011; Hockings *et al.*, 2006; Pomeroy *et al.*, 2004; White *et al.*, 2006).



Above: marine protected area in Raja Ampat

Above, right: healthy coral habitat in Maluku



CTC / M WELLY

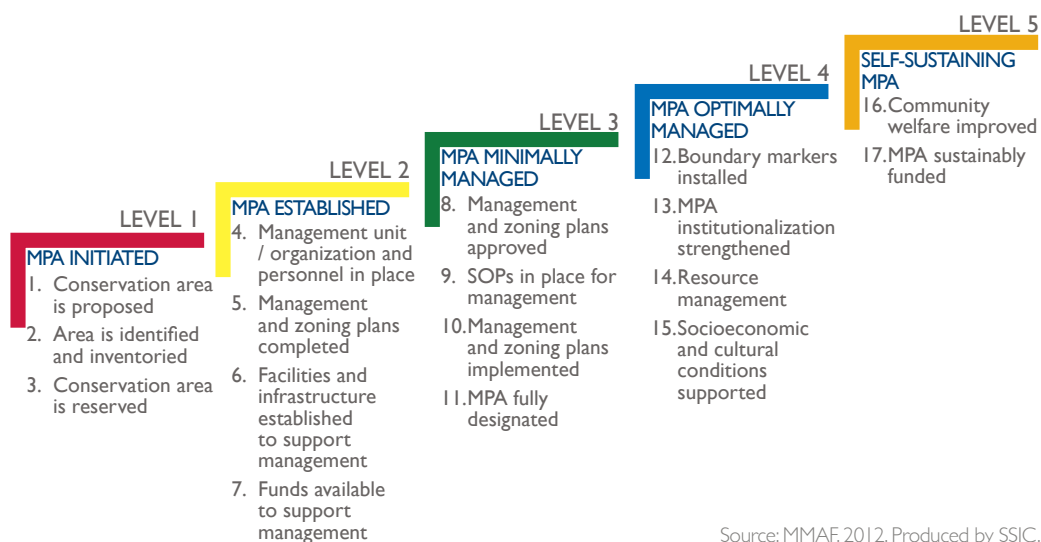
E-KKP3K outlines five levels, with 17 associated categories of achievements that an MPA needs to progress through in order to achieve effective management.

These steps provide a framework for MPA managers to follow in developing their sites, from undertaking surveys and inventories, to designing zoning and management plans, and acquiring sustainable financing.

Using the E-KKP3K tool also allows MPA managers to assess the status of their MPA against national standards and provides a mechanism to quantify and categorize the status of MPAs nationally. At the time of writing, 93 MPAs in Indonesia are categorized as ‘initialized’ (red), 34 are considered ‘established’ (yellow), and three are classified as ‘minimally managed’ (green), with the remaining MPAs not yet assessed.

Targets set for the coming years are as follows:

- **30 million ha of MPA are to be established by 2030** (Rusandi, 2017)
- **at least 35 of these MPAs are to be effectively managed by 2019** (MMAF, 2012).



Source: MMAF, 2012. Produced by SSIC.



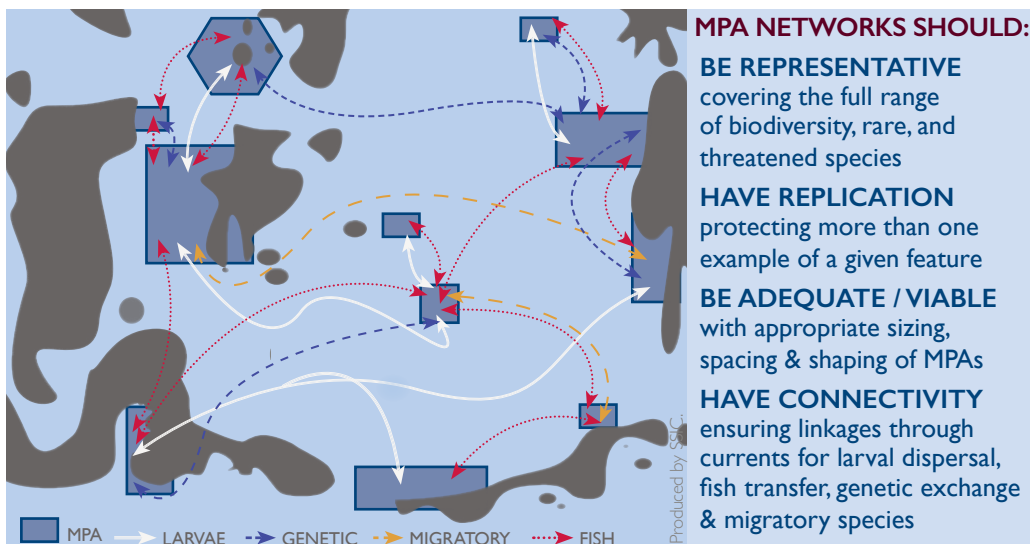
CTC

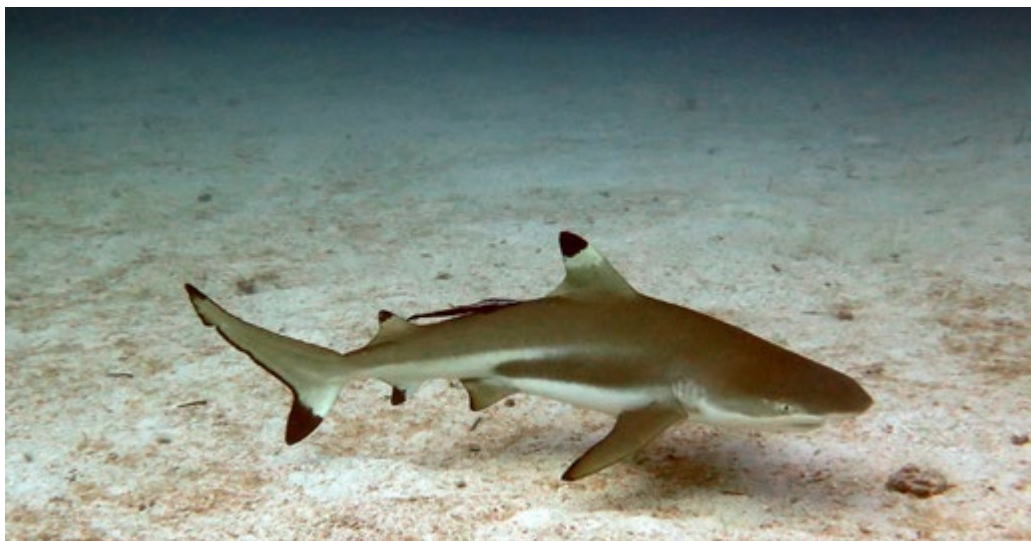
ESTABLISHING MPA NETWORKS

An MPA network is defined as “a collection of individual MPAs or reserves operating cooperatively and synergistically, at various spatial scales, and with a range of protection levels that are designed to meet objectives that a single reserve cannot achieve” (Green *et al.*, 2008a: 3).

Networks are generally located so that MPAs can interact ecologically with one another to enable the transfer and recruitment of larvae and create effective stepping-stone refuges for wider dispersal of fishery spillover. Studies have shown that connecting protected systems in this way promotes overall ecological robustness and system resilience against threats such as climate change.

Under Indonesian law (PerMen no. 13/2014), MPA networks are defined at a range of scales. Local level networks (established within one province) and regional networks (crossing provincial boundaries) can be established based on localized ecological linkages; while national networks may be transboundary, serving larger ecological support functions (such as megafauna migratory routes or cross-border collaboration for marine replenishment).





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To date, several MPA networks are in the process of being established. Some are at more advanced stages than others, such as the Tukang Besi Archipelago Network (in Sulawesi) and the Sunda-Banda Seascape Network (in Nusa Tenggara).

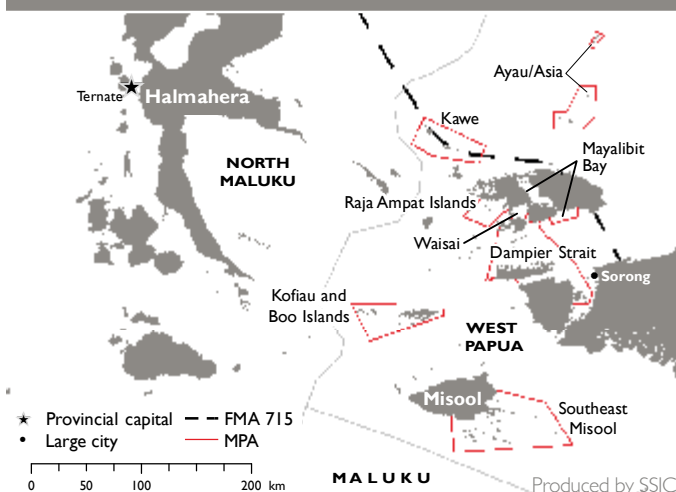
The Raja Ampat Network (in Papua) is perhaps the most advanced network in Indonesia, comprising seven MPAs extending over an area of 1,185,940 ha. This network is situated within the even larger Bird's Head Seascape, which collectively manages nearly 3.6 million ha of critical coastal and marine habitats, including more than 30 percent of West Papua's most important marine conservation sites. This seascape alone contributes over 20 percent of Indonesia's total MPA area (Nurhayati, 2017).



Above left: protected area networks increase the resilience of the marine environment

Above, right: blacktip shark pup protected by the Raja Ampat marine protected area network

RAJA AMPAT NETWORK



The USAID SEA Project is working with the government of Indonesia to support the design of a large MPA network in eastern Indonesia (in fisheries management area 715), as well as provincially-based MPA networks in North Maluku, Maluku, and West Papua. The initiative is also supporting the establishment, design, zoning, and effective management of five new MPAs and 11 existing MPAs in eastern Indonesia as exemplar models. These sites are anticipated to cover a combined area of at least 1.3 million ha, at least 10 percent of which will be designated as no-take. See SOTS volumes two and three for more information.



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To achieve these targets, work is going on across the country at a range of scales:

- Provinces across Indonesia are working to identify potential areas to establish new MPAs and to oversee the effective management of existing MPAs in collaboration with district government offices. These efforts are complemented by local communities establishing locally-managed MPAs and traditional customary reserves in several key biodiversity hotspots.
- Nationally, efforts are made to strengthen MPA policies and the associated regulatory framework. The aim of this is to support provincial MPA management bodies who oversee the long-term management of MPAs and the establishment of **MPA networks**. These networks are essential to promote connectivity between sites and marine resilience.



IMORGAN




T SCHULTZ

PROMOTING SUSTAINABLE MARINE TOURISM IN MPAs

Many MPAs in Indonesia are located in areas of outstanding natural beauty. The attributes that make these areas essential for conservation – healthy reefs, vibrant fish populations – are the very same attributes that attract tourists to these areas. Therefore, marine-based tourism often inevitably intersects with MPA establishment and brings with it both challenges and opportunities.

Unsustainably managed tourism can have detrimental effects on the marine and coastal environment. Coastal habitat may be removed to make way for tourism infrastructure. The presence of large numbers of visitors can lead to increased levels of localized pollution (sewage, trash, etc.), and inexperienced on-reef tourists (such as divers and snorkelers) can directly cause damage to reefs. These actions can threaten to degrade the very resource that people are drawn to visit.

Conversely, well-managed sustainable tourism can bring considerable benefits to an area. It can increase income-generating opportunities for local communities and generate revenue to support the conservation of the area (through tourism user fees and similar initiatives). It can also effectively incentivize community stewardship of the marine and coastal environment that the visitors are coming to see. Therefore, in recent years there has been a drive to promote sustainable marine tourism across the country.

 Above, left: establishing MPAs involves baseline surveys of biophysical conditions such as coral and fish health

Left: sustainable marine tourism at Misool Eco Resort, Raja Ampat

Above: MPAs are often established in areas of outstanding natural beauty

In 2014, the Ministry of Tourism released a mandate (PerMen no. 15/2014) that all dive operators must be assessed according to several criteria to acquire an operating license. One of these requires the operator to follow sustainability principles. This decree was further supported by the development of associated standard operating procedures (SOPs), which outline environmental protection practices for operators to follow for operators to follow (PerMen no. 7/2016).

In 2015, Indonesia hosted a regional business forum to explore sustainable marine tourism issues common to all six countries of the Coral Triangle (Indonesia, Malaysia, Philippines, Papua New Guinea, Solomon Islands, and Timor-Leste). The forum hosted representatives from all six governments, the private sector, NGOs, and civil society groups, and produced a range of recommendations and commitments. These included an agreement between all nations to develop a public–private task force dedicated to exploring and developing sustainable marine tourism standards within MPAs across the region.

Also in 2015, the Indonesian Ministry of Tourism signed an agreement with the Global Sustainable Tourism Council (GSTC) and the UN Sustainable Development Solutions Network to collaborate in developing sustainable tourism policies and trialing various certification schemes for sustainable destinations across the nation. In 2016, this partnership led to the Ministry of Tourism adopting the GSTC criteria for establishing and assessing sustainable tourism enterprises in a ministerial regulation (no. 14/2016).

The enormous potential of sustainable marine tourism to contribute toward payments for ecosystem services (PES) in Indonesia is also recognized.

In the coming years, efforts will continue to be made to promote sustainable marine tourism in MPAs. Work is already underway to harmonize best practices and codes of conduct between key government agencies, including the MMAF, the Ministry of Tourism, and the Ministry of Environment and Forestry. Public–private partnerships in MPAs are also promoted the development of sustainable tourism enterprises, and recognized certification schemes are promoted to encourage enterprises to meet sustainability standards in exchange for acquiring green credentials and associated marketing opportunities.



Produced by SSIC.

Over page: fisher with net

PAYMENTS FOR ECOSYSTEMS SERVICES (PES)

PES is a mechanism by which environmental services (or benefits) can be monetized to better reflect and acquire the value (and costs) of maintaining ecological systems effectively.

For example, charging tourism user fees (TUFs) for visitors to access an MPA is a form of PES, with the revenue generated being appropriately utilized in the direct and effective management of that MPA. An example of this in Indonesia can be found in Raja Ampat, West Papua, where a user fee is charged to all visitors entering the area, with the proceeds utilized for managing the MPA network in the area. In 2015, these fees alone generated USD 600,000.

SUSTAINABLE MARINE TOURISM CERTIFICATION PROGRAMS

A range of sustainable tourism certification programs exist globally, aiming to provide guidance to tourism enterprises and enable them to operate in a sustainable fashion. These programs require member enterprises to meet a range of sustainability criteria for certification. Once certification is acquired, it can be a powerful marketing tool for the enterprise, enabling it to reach an increasingly discerning tourism audience that is keen to use services proven to be environmentally and socially responsible.

In Indonesia, the Indonesia Ecotourism Network (IEN) works collaboratively with the GSTC and other international agencies to support members to meet detailed sustainability criteria for operations. The International Ecotourism Society (TIES) also provides support to its Indonesian office to advance sustainable tourism operations across the country, particularly in areas susceptible to human–wildlife conflict.

Certifications schemes specifically tailored to the marine and coastal environment are also available. For dive centers and snorkel operators, the ‘Green Fins’ certification program is becoming increasingly popular across the country. Operating in eight countries in southeast Asia, this program provides detailed codes of conduct for managing on-reef tourists and offers in-person assessment services, training, guidance, and monitoring support to operators. More recently, the ‘Signing Blue’ initiative launched by WWF-Indonesia has begun to gain traction across the country, providing sustainability guidelines to a range of tourism enterprises (including operators, hoteliers, transport providers, restaurateurs, guides, and handicraft producers). Through the Signing Blue Marine Tourism Improvement Programs (MITP), businesses commit to meeting sustainability standards and are able to share their experiences and lessons learned through the Signing Blue forum.

The USAID SEA Project is supporting these efforts by facilitating the harmonization of best practices for marine sustainable tourism in MPAs and promoting the adoption of certification programs in eastern Indonesia. The initiative is also trialing an economic rate of return (ERR) model at select MPA sites, which can help estimate the level of funds required to operate MPAs sustainably and identify opportunities for generating revenue from sustainable tourism to contribute to these costs. For more information, see volume two.



ACTION FRAMEWORK

FISHERIES



T SCHULTZ

Sustainably managing a complex and multifaceted production sector such as fisheries requires strong legal and policy frameworks, an integrated approach to management, and a wide range of management actions.



Above: fisherman with catch of yellowfin tuna in Sulawesi

Below, right: mobile lift net, Dampier Strait

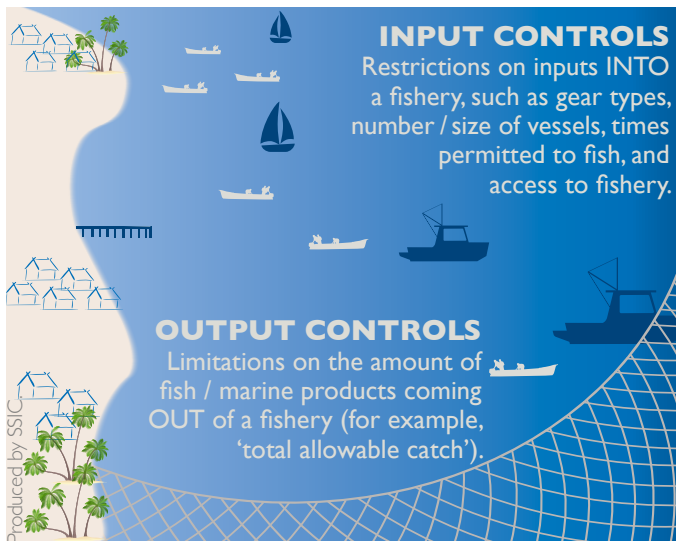
LEGAL & POLICY FRAMEWORKS FOR FISHERIES

Whilst a wide range of laws, policies, and regulations exist in Indonesia related to fishery resource management, one of the most central pieces of legislation is the Fisheries Act (no. 45/2009 *jo* no. 45/2009), which is the implementation of article 33(3) of the Constitution of the Republic of Indonesia related to the fisheries sector. This act regulates the management of fishery resources, ecosystem conservation efforts, conservation of fish species, and conservation of fish genetics.

The Fisheries Act (article 7) confers rights to the MMAF to implement management measures to control fishing activities. Related policies and regulations emerging from this act can be categorized into three key areas:

- (1) the management of fish catches through technical measures such as input and output controls
- (2) maximizing revenue generation by adding value to the catch harvested through the provision / promotion of appropriate storage and transportation systems, post-harvest processing, market linkages, and production qualities to meet domestic and international standards
- (3) the enhancement of aquaculture production by promoting investment and establishment of aquaculture operations.

The act also criminalizes the use of illegal (destructive) fishing methods and activities that pollute or degrade the fisheries and associated ecosystems.



Over the years and through the various iterations of the Fisheries Act, a considerable number of complementary policies, laws, national and local regulations have been produced (into the hundreds). Most recently and notably these have included: a minimum size limit on individuals of key commercial crab and lobster species (to limit the catch of juvenile individuals) (PerMen KP no. 1/2015); a ban on catches of some juvenile commercial species (such as blue swimming crabs with a carapace width of < 10 cm) (PerMen KP no. 1/2015); the prohibition of trawl and large seine fisheries nationwide (PerMen KP no. 2/2015); a one-year moratorium (temporary ban) on new licenses for all foreign-built vessels, coupled with the prohibition of future licenses issued to vessels over 150 GT in order to reduce large-scale fishing in the country (PerMen KP no. 56/2014); and a ban on manta ray fishing (KepMen no. 4/2014).

Therefore, a range of legal and policy frameworks for coastal and marine fisheries have been developed in recent years to promote the sustainable management of fishery resources. However, there is still a great deal more to be done.

In 2017, the legal bureau of the MMAF undertook a comparative analysis between Indonesia's fisheries law, international frameworks, and the laws of neighboring nations (including the Magnuson-Steven Fishery Conservation and Management Act of the United States, and the Philippine Fisheries Code). From this, a range of recommendations have been made to advance amendments to law no. 31/2014 and law no. 45/2009 on fisheries. In addition to this, it was noted that under the existing legal frameworks, small-scale fisheries (SSF) remain under-recognized and lacking support or strategic management. Representing more than 90 percent of Indonesia's fishing fleet, these small-scale operators are the bedrock of all fisheries in Indonesia,

providing critical contributions to economic and social well-being and food security. As such, it will be essential in the coming years to ensure these fishers are better represented and supported under law and policy frameworks.



KEY RECOMMENDATIONS FOR FISHERY LAW AMENDMENTS FROM THE COMPARATIVE ANALYSIS

A comparative analysis undertaken in 2017 by the legal bureau of the MMAF with support from the USAID SEA Project recommended Indonesian fishery law be adapted to:

- more clearly recognize and promote sustainable fishery management mechanisms
- formally recognize customary law in fishery management
- promote fishery management planning
- formally recognize an ecosystem approach to fishery management as a guiding principle for Indonesia
- ensure protections are established for newly developed sustainable fishery businesses
- adjust the definition of fishing vessel tonnage
- provide protection for traditional pole and line fishers
- adjust the definition of small-scale fishers (as described under law no. 7/2016)
- improve vessel tracking efforts through registration of all boats, large and small
- add detention penalties as a preferred deterrent to financial penalties.

It was noted that law and policy frameworks should include supportive academic information and clear explanations with regard to overfishing practices, threats to fishery stocks, non-effective fishery management mechanisms, unsustainable practices, non-effective law enforcement, and the importance of utilizing science and technology. Policy format was also recommended to be segmented into three areas: (1) fishery management in Indonesian waters, (2) fishery management in the exclusive economic zone and continental shelf, and (3) international fishery coordination.

To address this, an SSF special interest group has been established, led by the MMAF and involving a wide range of stakeholders (including SSF experts and academics, research institutes, relevant NGO practitioners, fisher associations, and provincial agencies). At the time of writing, this group is undertaking a review process aimed at strengthening fishery policies to better represent the concerns of SSF in Indonesia.

Issues explored include the development of a functional definition of SSF to help clarify terminology and positioning in policy-related decision making; examining potential segmentation of fishing fleets eligible for licensing exemption; developing a log book for SSF to better capture data from this sector; and assessing the potential for appropriate incentive provisions to promote sustainable practices within SSF groups.

The USAID SEA Project is providing support to a number of these initiatives, particularly in relation to advancing the legal frameworks to support small-scale fishers. In the coming years, the initiative will also support the implementation of the recommended adjustments to the legal frameworks identified.



T SCHULTZ



Above: fish on a line

IMPLEMENTING AN ECOSYSTEM APPROACH TO FISHERIES MANAGEMENT

On the ground and in the water, it has become increasingly clear in recent years that traditional fisheries management approaches have not been effective. These approaches have mostly tried to manage individual fishery species in isolation, based only on considerations of fishery catch information. However, in reality, fishery products are borne out of complex ecosystems, with multifaceted social, economic, and governance issues driving and influencing them. It is therefore essential to understand these complexities and factor them into fisheries management planning (Staples *et al.*, 2014).

To this end, since the turn of the century, there has been a shift in marine and coastal management to adopt what is known as an **ecosystem approach to fisheries management (EAFM)**.

“[EAFM is] ... an approach to fisheries management and development that strives to balance diverse societal objectives, by taking into account the knowledge and uncertainties about biotic, abiotic, and human components of ecosystems and their interactions and applying an integrated approach to fisheries within ecologically meaningful boundaries.”

The United Nations Food and
Agriculture Organization, Fisheries
Department, 2003: 6

EAFM provides a framework for developing fisheries management approaches that are realistic, equitable, and sustainable.

Since its inception, EAFM has been evolving globally, and in the late 2000s Indonesia adopted EAFM to guide national and regional fishery planning. Fishery regulations now stipulate that all of the 11 FMAs in Indonesia need to have an EAFM plan in place to sustainably manage productive fisheries. These will be implemented through provincial governments, with support from the national government.

Each of these plans are expected to be living documents that continue to be refined and developed over time; the ultimate aim for each FMA is to have clear and defined **harvest strategies** for all key fishery resources relevant to the area.

To support these efforts, a national working group for EAFM (NWG–EAFM) has been established that engages participants from a wide range of sectors, including cross-sectoral government agencies within the MMAF, academic institutions, universities, and NGOs. This working group, recently formalized through a DG Capture Fisheries decree (no. 48/2017), supports the government in mainstreaming EAFM into fishery management in Indonesia and has included the development of a roadmap for national policy to support EAFM.

For ground-level implementation, however, it will be within the remit of FMCs and the respective provinces to lead the way in EAFM planning and implementation in their regions. To achieve this, considerable capacity-building support will be necessary for all council representatives and key provincial government agencies.

WHAT IS A HARVEST STRATEGY?

A harvest strategy sets out the management actions (harvest control rules) necessary to achieve defined biological and economic objectives in a given fishery (DAFF, 2007).

Key elements of any harvest strategy include:

- a process for monitoring and conducting assessments of the biological and economic conditions of the fishery
- rules that control the intensity of fishing activity according to the biological and economic conditions (as defined by the assessment) (DAFF, 2007).

A harvest strategy should define the operational objectives of the fishery (Sloan *et al.*, 2014) as well as specify targets and limits of the fishery (MPI–NZ, 2008).



The **USAID SEA Project** supports the national-level adoption and advancement of EAFM, and the development of frameworks for EAFM support to provinces across the nation. The initiative also targets support to fisheries management area 715 to become an exemplar region for EAFM on the ground. Support is provided for EAFM planning and the implementation of associated fishery interventions at 20 sites across the FMA, focusing on demersal, small pelagic, and pelagic fish species, as well as non-fish species. See more information in SOTS volumes two and three.



Above: key fisheries resources such as yellowfin tuna need clear and defined harvest strategies

Over page: impounded IUU vessels

WHAT DOES EAFM PLANNING & IMPLEMENTATION INVOLVE?

Key elements to consider when undertaking an ecosystem approach to fisheries management can be summarized as follows.

- (1) **Knowing the status of your fishery**, achieved through a range of assessments, often requiring considerable research and temporal (long-term) data collection. The MMAF guidelines for EAFM indicators (produced through the NWG–EAFM) identifies six key ecological and social domains to explore (Adrianto *et al.*, 2016; NWG–EAFM, 2014).

Ecological domains include:

- habitat status (corals, seagrass, mangroves, as well as unique ecosystems, water quality, and marine productivity)
- fish resource status (catch per unit effort, catch composition, range, biomass, and ETP species)
- the use of technologies and gear types (levels of selectivity, capacity, effort, legal compliance, and the use of any destructive or illegal practices).

Social domains include:

- stakeholder considerations (traditional knowledge, levels of participation, fishery conflicts)
- economic considerations (status of fisher household assets, incomes, and saving ratios)
- governance / institutional considerations (status of regulations, decision-making mechanisms, cross-institutional synergy, capacity levels).

- (2) **Implementing fishery interventions**, using the results of the assessments to identify appropriate management actions to sustainably manage the fishery. A harvest strategy is developed to implement those actions. This may involve the use of a range of input and output controls. The management actions identified in any harvest strategy are tailored to the fishery in question.
- (3) **Exploring mechanisms to incentivize sustainable fishing** to promote compliance with the planned interventions. This is particularly important in areas where management actions meet with resistance from fishers (and wider members of the industry) fearful of negative impacts the action may have on their livelihoods. Incentives are tailored to the fishery in question. Examples include: engaging fishers in certification programs (e.g. marine stewardship council or Fair Trade schemes) to generate higher or more consistent income levels for sustainably harvested products, or implementing improvements to post-harvest management (e.g. better infrastructure, improved linkages to markets) to reduce levels of product spoilage and promote maximal income generation per catch.
- (4) **Managing and monitoring the fishery** to ensure compliance so that the fishery is operating sustainably. This includes a wide range of activities, from on-water surveillance operations to routine monitoring of stocks, habitats, and ecosystem health. Such efforts require the engagement and involvement of fishers and the wider industry in activities such as registering vessels, completing logbooks, complying with licensing systems, and providing data and information to managers to ensure the fishery is meeting environmental, social, and economic goals.



ACTION FRAMEWORK

ENFORCING
THE LAW



J MORGAN

Law enforcement is a critical component of effectively managing marine and coastal resources and needs to be implemented at a range of scales.

Above: on-water surveillance

NATIONAL & INTERNATIONAL ENFORCEMENT

At the national level, marine law enforcement efforts have been particularly focused towards tackling **illegal, unreported, and unregulated** (IUU) fishing. In 2007 Indonesia became a signatory nation to the regional plan of action to prevent, deter, and eliminate IUU fishing from Indonesia's water, followed in 2012 by the production of a national action plan on the prevention and elimination of IUU fishing (KepMen no. 50/2012).

On-ground and in-water efforts to address IUU fishing began to be scaled up considerably in 2014, in response to President Joko 'Jokowi' Widodo's statement that the nation "...has an obligation to develop its maritime defense forces" and "maintain and manage marine resources" (pillars five and two of the maritime axis strategy as announced at the 9th East Asia Summit in November 2014). A one-year moratorium on new licenses for all foreign-built vessels was imposed in 2014 (PerMen no. 56/2014), and an inter-agency task force was established by the MMAF with the mandate to implement license reforms and develop comprehensive guidelines to combat IUU fishing.

This **task force for the prevention and eradication of IUU fishing** undertook an assessment of 1,132 ex-foreign vessels blocked by the one-year moratorium in 33 ports across the country. The assessment found that 100 percent of these vessels were infringing a range of marine and fishery laws, with 68 percent of them committing severe violations (Husein, 2015). In addition to this, many vessels were found to be engaged in wider illegal activities, including money laundering, smuggling, tax fraud, forced labor, and human trafficking. Further studies revealed that forced



DG PSDKP

labor and human trafficking have been particularly prevalent amongst this industry for a considerable time. Between 2004 and 2015, 1,445 cases of human trafficking using IUU vessels were identified by the Indonesian authorities, and more than 1,000 indentured laborers have since been rescued from illegal servitude on these vessels (Husein, 2015).

In 2015, under the leadership of the Minister of Marine Affairs and Fisheries, Ibu Susi Pudjiastuti, approximately 14 percent of the entire MMAF budget went to surveillance of marine and fishery resources, with much of this dedicated to battling IUU fishing, supporting the Indonesian Navy, the marine police, and associated agencies to conduct patrols and tackle IUU vessels. As early as 2007, enforcement teams had been implementing forced sinking of IUU vessels in particularly severe cases. This response has escalated in recent years under the leadership of the MMAF and through support from a separate joint IUU enforcement task force established by the President, involving the MMAF, the navy, the police, coast guards, and public prosecutors.



Above: IUU vessel being forcibly sunk

Below: police station located over the ocean in an effort to combat illegal fishing in Sulawesi

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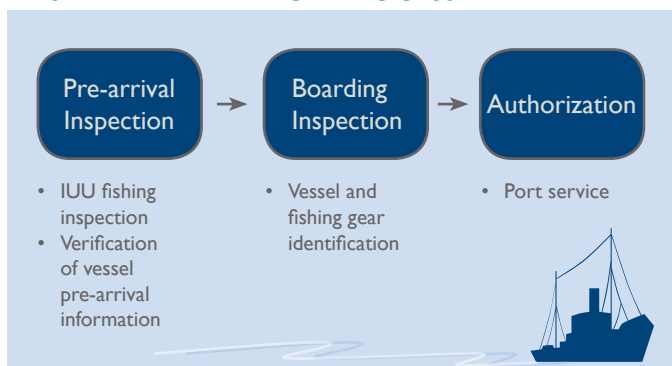
By August 2015, 134 IUU vessels had been forcibly sunk (blown up). This sent a strong message to IUU vessel owners and wider individuals and organizations involved in this illegal activity that IUU will not be tolerated in Indonesia's waters.

In 2016, Indonesia signed a joint communique with New Zealand to further combat IUU fishing and promote sustainable fishery governance. In the same year, the International **Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Underreported and Unregulated Fishing** was ratified (through Presidential Regulation no. 43/2016). This agreement aims to ensure all signatory nations make a concerted effort to improve the management of vessels entering signatory nations' ports, including improving port-based inspections and investigations.

Since the ratification of this port state measures (PSM) agreement, the MMAF, supported by the USAID SEA Project, has worked in consultation with ten national ministries / agencies to identify five priority actions for implementing the agreement in the coming years. These are to: (1) strengthen the coordination of information gathering and sharing amongst port authorities and agencies; (2) strengthen policies and regulations amongst the relevant ministries / agencies in order to reflect the commitments of the agreement; (3) build capacity of port personnel and associated stakeholders for key port services; (4) strengthen the SOPs for port services, including inspections; and (5) improve the port-based facilities needed to implement the PSM agreement. At the time of writing, these actions are in the process of being implemented in priority port sites, to trial various approaches, learn lessons, and establish a *modus operandi* for future roll-out at the national level.

Indonesia is also leading the charge globally to have **IUU fishing classified as a transnational organized crime**. IUU activities do not respect international boundaries, and a large number of international vessels have been found conducting IUU fishing in Indonesia's waters. It is therefore essential for nations to work together to combat this threat to sustainability and future food security. It is expected that classifying IUU as a transnational organized crime will lead to it becoming recognized and addressed by international crime-fighting agencies, and appropriate resources will be made available for tackling the issue globally.

PSM IMPLEMENTATION PROCESS



Right: ship in port, Jakarta

In February 2017, Minister Susi Pudjiastuti called on the UN and European Commission to recognize this classification, and while the transnational crime status of IUU fishing has not yet been recognized (at the time of writing), Indonesia has received backing from the President of the UN General Assembly to further explore this classification.

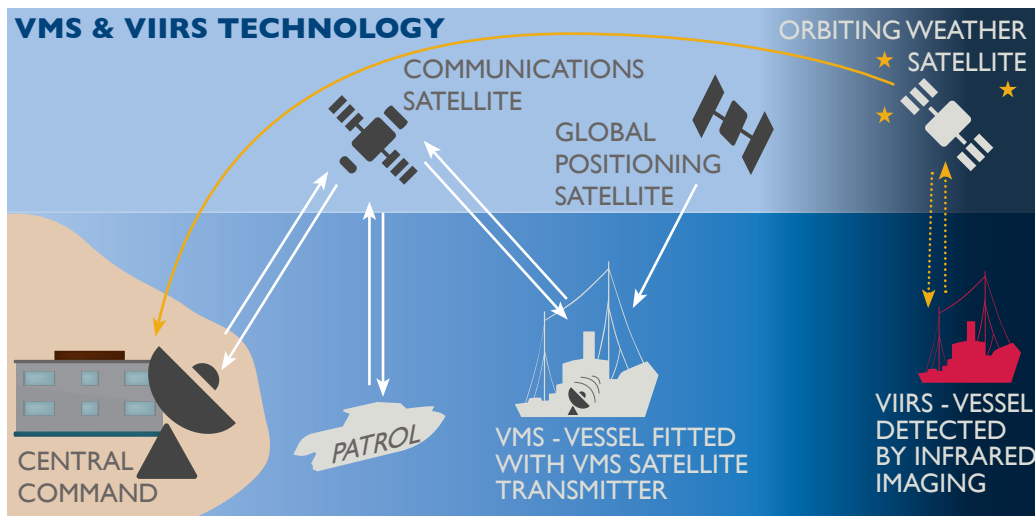
Since 2002, national-level law enforcement has been supported by the use of **vessel monitoring systems (VMS)**. These are small units installed on vessels with a satellite location transmitter that provides real-time information on the ship's location and activities. In Indonesia, the law stipulates that all vessels over 30 GT are required to have VMS on board, and the information is relayed not only to central command areas, but also directly to at least 15 patrol vessels stationed across the archipelago.

In 2017, the Republic of Indonesia became the **first nation ever to openly share this VMS data online**, in real time, revealing the location and activities of its commercial fishing fleet. The data is now available at all times through the online platform Global Fishing Watch (www.globalfishingwatch.org). Sharing this with the world has been a bold step in promoting transparency in the nation's fishing industry. Indonesia is now urging other nations to follow suit and share their VMS data.

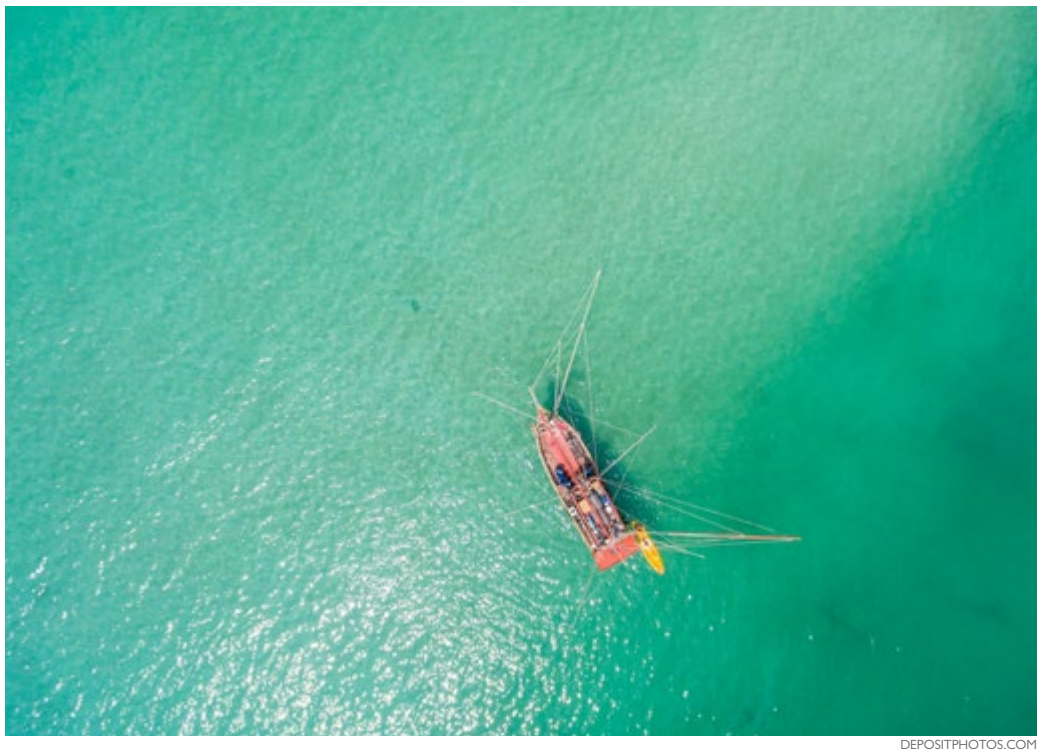
“Illegal fishing is an international problem, and countering it requires cross-border cooperation between countries I urge all nations to join me in sharing their vessel monitoring data with Global Fishing Watch. Together, we can begin a new era in transparency to end illegal and unreported fishing.”

Hon. Minister Susi Pudjiastuti speaking at the UN Oceans Conference, June 2017

In addition to this VMS system already utilized in Indonesia for large fishing vessels, the MMAF is also exploring the use of **visible infrared imaging radiometer suite (VIIRS)** technology. This is a satellite-based technology that does not require the vessel to have any kind of unit installed. This is advantageous, as vessels operating illegally are often found to tamper / break their VMS units to avoid detection.



Source: Hiteshk, 2016. Reproduced by SSIC.



DEPOSITPHOTOS.COM

The VIIRS technology uses a sensor located on an orbiting weather satellite (the Suomi National Polar-orbiting Partnership satellite). This sensor is able to collect light imagery of vessel activities (at night), as well as radiometric measurements of the land, atmosphere, cryosphere, and oceans in the visible and infrared bands of the electromagnetic spectrum and makes this data available through products referred to as 'earth system data records' (ESDRs) (Gleason, 2017; Raytheon, 2017). Primarily developed for the US National Aeronautics and Space Administration (NASA), these ESDRs are intended to contribute to the larger scientific community, and through agreement with the United States Government, Indonesia has been given access to the system to utilize for surveillance activities.

At the time of writing, potential applications for the VIIRS technology are being explored. The ESDRs are already utilized to validate the spatial use of marine waters and support the mapping of fishing grounds and the predictive modeling developed through the MMAF's Institute of Marine Research and Observation (IMRO). Such work could potentially support the future development of harvest control rules that distribute fishing pressure and avoid competitive or overwhelming use of key areas. The technology may also prove useful in tackling illegal fishing activities in smaller-scale fleets and monitoring levels of compliance in no-take zones in marine protected areas.

● Above: without modern technology, fishing vessels are virtually unidentifiable in open seas
Above, right: marine police vessels in harbor, eastern Indonesia

The USAID SEA Project is working in collaboration with a range of partners to support the PSM agreement. Efforts are focused on improving the capacity of fishery inspectors and managers to conduct on-board PSM inspections, developing associated training curricula for future institutionalization, and on strengthening SOPs to provide professional port services. Likewise, support is provided to explore the optimization of VIIRS technology for use in fisheries management planning and MPA monitoring, particularly related to activities in restricted-use zones. Work is also underway to ensure the hardware and software capabilities within the MMAF are sufficient to manage VIIRS data, and a VIIRS internship program is being implemented to support all of these efforts, in collaboration with NOAA and the USAID Program to Extend Scholarships and Training to Achieve Sustainable Impacts (PRESTASI).



SSIC / L KOLA

REGIONAL & LOCAL ENFORCEMENT

At the regional and local level, on-water patrol and surveillance activities are supported by the Indonesian marine police (*Polair*), who number at least 12,000 and are distributed across the archipelago (2011 figures). Their main tasks are to serve, protect, and maintain security and public order within the nation's EEZ. This includes promoting community engagement in marine-based surveillance and providing security for those earning their livelihoods on the water.

As *Polair* officers have the right to make arrests, they often accompany local patrols by MMAF and fishery department personnel at the provincial and district levels in response to reports of illegal fishing activity or to safeguard particular coastal areas under some form of management (such as MPAs). Across the country, the MMAF fleet is comprised of 25 decked patrol vessels and 64 speedboats (OECD, 2013); some provincial and district departments also have their own small speedboats for localized patrolling.

However, in an archipelago with such a vast marine and coastal area, there are severely limited resources available for systematic patrolling. This includes financial and human resource limitations, as well as logistical challenges such as provisioning and access to fuel for boats. Therefore, patrolling to enforce MPA regulations or harvest control rules in small-scale fisheries is often de-prioritized in order to channel resources towards tackling more severe criminal activities, such as destructive blast fishing or large vessels operating illegally.

Given these resource restrictions, community-based surveillance groups provide essential services for local in-water surveillance support. These groups are known as *Kelompok Masyarakat Pengawas*, or *pokmaswas*. The core principle of a *pokmaswas* is the active participation of community members in monitoring and managing the marine environment in a responsible manner (as referred to in article 67, law no. 45/2009).

WHAT ARE POKMASWAS?

These are community groups allocated responsibilities to supervise the marine environment, particularly in relation to any local conflict situations. They can be assigned specific tasks depending on the needs of a particular coastal area, including undertaking patrol, surveillance, and monitoring activities.

Specifically, a *pokmaswas* are considered to be:

- a collection of exemplary citizens supporting the implementation of fishery rules and reporting to the surrounding community
- part of the overall coastal management system
- a partner group to fishery enforcement officers and civil service investigators in conducting surveillance activities
- monitoring support personnel for the implementation of fishery legislation (Fisheries Act 45, 2009).

Areas beyond the mandate of *pokmaswas* members (and not permitted to be undertaken) include:

- judging offenders / offenses
- acting as law enforcement
- implementing rules that do not have a legal basis
- using their role as *pokmaswas* members for personal or group gain
- allowing offenses to take place without any response / prevention efforts / stopping the violations.

Generally, *pokmaswas* implement what is known as a *Sistem Masyarakat Mengawas*, or *sismaswas*, which is a community-based system for effectively supervising and managing an area (MMAF ministerial decree, KepMen no. 58/2001). *Pokmaswas* usually consist of community leaders, religious leaders, traditional leaders, representatives from NGOs, fishermen, maritime communities, and coral reef monitoring officers.

Such groups provide critical support to law enforcement, as members have a greater understanding of the local conditions, challenges, and threats to an area, and are positioned locally, so that regular monitoring activities can be implemented.



T SCHULTZ

A HOLISTIC APPROACH TO LAW ENFORCEMENT

Beyond patrol and surveillance activities, effective law enforcement in Indonesia requires a holistic approach to tackle the causes and drivers of illegal activity. This includes undertaking research and investigation activities at a range of scales as well as implementing extensive awareness-raising, communications, and behavior change programs.

For example, on-water patrols are not, by themselves, sufficient to combat the enduring challenge of illegal and **destructive blast fishing** activities in Indonesia's waters. Additional efforts are needed, including:

- understanding the motivation behind blast fishing
- identifying and blocking the supply chain of the raw materials needed for blast fishing
- promoting an awareness amongst all sectors of society about the impacts of blast fishing
- encouraging willingness on the part of wider society to avoid buying the products of blast fishing
- motivating blast fishers to change their practices.

Under ministerial decree KepMen KP no. 82/2016, each FMA management plan should incorporate a clear process for researching these wider factors and holistically tackling destructive fishing practices. In addition to this, the MMAF has established a database on destructive fishing practices to help guide and inform response efforts and provide lessons learned and best practice approaches to provinces and on-ground response units.



Below, left: community patrol

Below: destructive fishing has a devastating physical impact on coral reefs

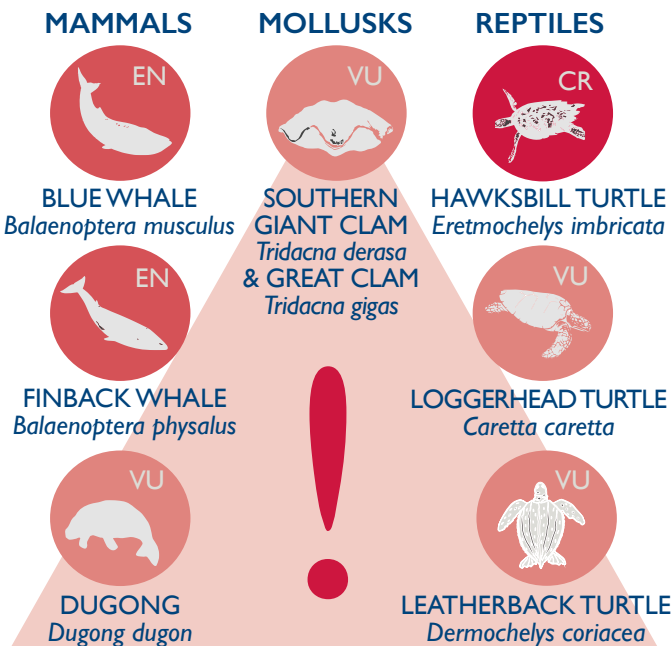




N WANG

A holistic approach to law enforcement is also required when tackling the challenge of illegal trade in **ETP species**. Under Indonesian law, a range of species have been given protected status (in line with the CITES framework). However, despite their legal protection, illegal capture and trade remains prevalent across the country, to provide source materials for food, medicines, cosmetics, and fashion, as well as to supply live animals to unscrupulous zoos, private collectors, and breeders (Hilton, 2016).

MARINE SPECIES AT RISK



OTHER MARINE PROTECTED BIOTA

MAMMALS	MOLLUSKS
Humpback whale (<i>Megaptera novaeangliae</i>)	Bear paw clam (<i>Hippopus hippopus</i>)
REPTILES	China clam (<i>Hippopus porcellanus</i>)
Olive/Pacific ridley (<i>Lepidodhelys olivacea</i>)	Crocus clam (<i>Tridacna crocea</i>)
Flatback turtle (<i>Natator depressa</i>)	Largest claw mussel (<i>Tridacna maxima</i>)
Green turtle (<i>Chelonia mydas</i>)	Fluted giant clam (<i>Tridacna squamosa</i>)
Marsh crocodile (<i>Crocodylus porosus</i>)	Trumpet triton (<i>Charonia tritonis</i>)
FISH	Horned helmet (<i>Cassia comuta</i>)
Coelacanth (<i>Latimeria manadoensis</i>)	Top shell (<i>Trochus niloticus</i>)
CORALS	Green turban shell (<i>Turbo marmoratus</i>)
All species in the genus (<i>Antiphatas</i> spp.)	Pearly-chambered nautilus (<i>Nautilus pompilius</i>)
CRUSTACEANS	
Horseshoe crab (<i>Tachypleus gigas</i>)	
Coconut crab (<i>Birgus latro</i>)	

IUCN Categorization:
 CR - Critically Endangered;
 EN - Endangered; VU - Vulnerable

Sources: IUCN, 2017; UU, 07/1999, Produced by SSIC.

Above: illegally harvested fins are often sold as food

Above, right: many targeted ETP species, such as manta rays, are vulnerable to over-exploitation

Over page: using local cultural attractions to deliver conservation campaign messages



E PEARCE

Tackling this pervasive issue requires extensive investigation and response efforts. Sources of illegal wildlife need to be identified and blocked to stop wildlife capture at source. Traders and exporters of ETP species need to be identified and sufficient evidence gathered to ensure effective prosecution. Capacity for dealing with wildlife crime needs to exist at all levels of jurisdiction, from local and regional enforcement teams (to enable them to identify and respond to wildlife crimes) to all agencies involved in combating this crime (including DKP, PSDKP, BKIPM, *Polair*, and the navy) as well as prosecutors, litigators, and judges.

To support these efforts, an association of civil service investigators (*Penyidik Pegawai Negeri Sipil – PPNS*) was established in 2015 under the MMAFs surveillance department (PSDKP) to serve as a guiding body to unite and align the operations of different investigative departments (through Kep no. 75/DJPSDKP/2015). Multiple agencies have also been involved in operations through a wildlife crime unit (WCU) established with support from the Wildlife Conservation Society (WCS) in 2003 and responsible to date for investigating more than 350 cases of wildlife law violations, with a prosecution rate of more than 90 percent.

However, while the demand for illegally-acquired marine products continues to rise globally, it will remain a considerable challenge for Indonesia to keep pace with this ever-growing industry, and more resources, innovations, and efforts are required for ETP species to be protected.

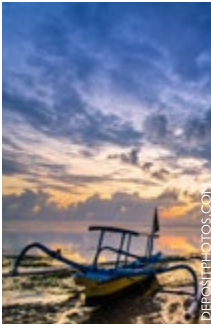
The USAID SEA Project is supporting the establishment and effective operationalization of *pokmaswas* units across select sites in FMA 715. The project is also undertaking research into destructive fishing practices (particularly the supply chain of blast fishing materials) to inform and guide FMA planning and the development of provincial action plans (*Rencana Aksi Daerah – RAD*) to combat this illegal activity in North Maluku, Maluku, and West Papua provinces and to provide relevant capacity-building support cross-sectorally. The findings will also support the design of initiatives to promote public awareness on how to avoid purchasing products from blast fishing. The project is also involved in trialing ETP investigation support in North Maluku, aiming to identify capacity-building needs for relevant enforcement and judiciary sectors.



CHAPTER 5

CHANGING BEHAVIORS TO ACHIEVE A SUSTAINABLE FUTURE





Human behavior is at the very heart of all environmental issues. It is human behavior that creates the challenges, and only by changing that behavior can we hope to find solutions.

The previous chapters have outlined the extensive management frameworks for action that exist to address marine and coastal challenges in Indonesia. They have shown that the legal and regulatory environment surrounding sustainable marine management is extensive, and while some key policy gaps remain, it is clear that the foundation for sustainability exists and has advanced considerably in recent years.

It is important to note, however, that all of the various efforts underway, as described in the previous sections, have one key commonality. **They are about managing people.** They are about adjusting individual and organizational behavior patterns to achieve a sustainable future. They are about people taking responsibility for actions that are undermining the viability of the marine environment and adjusting those actions accordingly.



Left: Papuan woman

Below: villagers work together to land a boat in North Maluku

CTC / Y PUTRA





USAID SEA / I R TARMIDJI

Tackling destructive fishing ultimately requires fishers to stop using destructive methods. Tackling overfishing requires fishers and the wider industry to operate within the bounds of the harvest control rules identified. Combating ETP trafficking requires suppliers and traffickers to stop engaging in this illegal practice (at both the demand and supply end of the trade). Addressing pollution requires people to change their consumption and waste disposal practices, and municipalities to provide a sustainable means for waste management. Safeguarding an MPA requires people to respect the management regulations of the area.

Changing individual and institutional behavior, however, is no easy task. **Individuals** act and behave according to a variety of influencing factors. These range from fundamental actions related to survival (i.e. people fulfilling their primary needs for livelihoods and security) to non-survival behaviors

(shaped by cultural preferences, peer pressure, family legacies, availability of skills, availability of support networks, availability of alternatives, media influences, and a lot of other factors).

Institutions, whether governmental or private sector, small or large-scale, operate according to hierarchical structures and generally fixed mandates. Individual behaviors within institutions must conform to the overall institutional goal. To that end, actions of employees must conform to expectations, and behaviors within an institution cannot change unless that change is supported in the higher echelons of the organization.



KAZIS



SSIC / E CARTER

Therefore, changing individual and institutional behaviors to achieve the various goals for sustainability promulgated in Indonesia requires, firstly, political will across all echelons of government and the civil service. In recent years, exceptional progress has been made in developing national policy frameworks and associated regulations to promote sustainability. However, if these are to be actioned, personnel at all levels of government will need to understand and implement their roles with a clear mandate for success and with the necessary support to achieve their functions.

Secondly, it is critical to gain support and compliance from key stakeholders in marine and coastal management. These are many and varied; from fishers, traders, processors, and all actors in a fishery supply chain to tourism operators and all other marine resource users and/or immediate beneficiaries of marine goods and services.

These are often the individuals and/or institutions that are at the frontline of interactions with the marine and coastal environment. Achieving change amongst these stakeholders is not an automatic outcome of a new policy or piece of legislation. It requires a proactive adaptation of behaviors or adoption of new practices. To this end, a holistic approach to stakeholder engagement, communication, and incentivization is needed.

CT-PEW / T REED



Above left: talking to fishermen about fishing practices in North Maluku

Left: opening ceremony of the ocean festival, 'Banda for the Ocean', in Maluku

Above: children playing in the ocean

Right: conservationist talking with a community about marine and coastal management

Promoting change requires a thorough understanding of the factors influencing particular behaviors. This includes gauging the levels of knowledge around the behavior: Are people aware of the consequences of their actions, do they know the existing regulations or restrictions to that behavior? It includes understanding the existing levels of flexibility people have for change: Do individuals have no choice but to act in an unsustainable fashion to meet their basic needs of food, income etc., and if so how can this be addressed? Understanding the existing attitudes and feelings about a behavior is important:

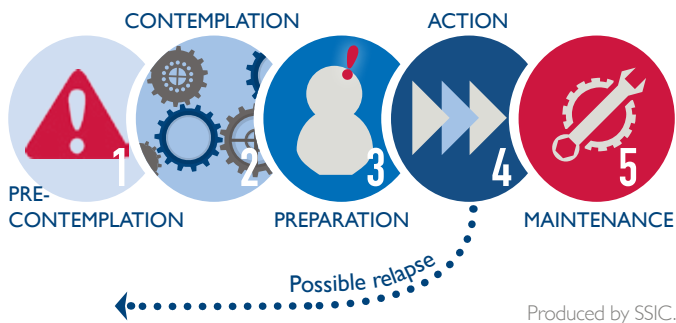


Even where change may be viable, are there cultural factors or customary issues at stake that create resistance? Are people aware of the potential benefits change can bring? What incentives exist (or could be implemented) to encourage change? And what disincentives need to be overcome for change to occur?

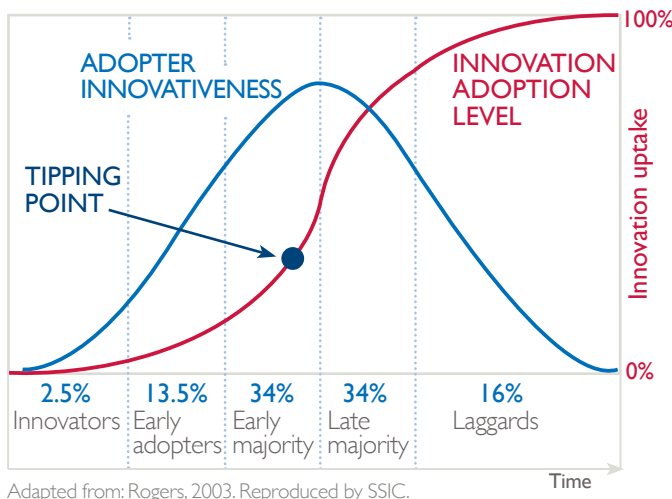
Armed with this knowledge, it is then important to identify the opportunities and avenues to leverage change. This involves identifying the appropriate channels through which to reach people and promote change (for example, through religious institutions, media, and/or other information channels), as well as identifying potential mechanisms to promote change (for example, through community events, social activities, information sharing, training, or other means). Change also generally requires the existence of so-called ‘change agents’, such as local respected influencers within societies, who become champions of the change.



CTC / M WELLY



THE DIFFUSION OF INNOVATION CURVE



Studies have shown that changing behaviors in *individuals* tends to follow a five-step process. This involves: (1) pre-contemplation, (2) contemplation, and (3) preparation – these are all steps undertaken prior to any change taking place. They are followed by (4) action, when a behavior is adjusted, at which stage relapse to the previous behavior is still possible, and finally (5) maintenance, when the new behavior is fully embraced, and relapse to the old behavior no longer occurs (Prochaska et al., 1992).

Changing behaviors within *societies* tends to follow a classic bell curve pattern. Here, the number of individuals adopting the new behavior increases until a point of critical mass is reached (known as a ‘tipping point’), where the new behavior starts to become a new ‘norm’ in the society, leading to overall majority adoption, with only a small segment of society (known as ‘laggards’) still engaging in the old behavior. This process is known in social science theory as the ‘diffusion of innovation’ curve (Rogers, 2003).

Above left: campaign poster for a government-lead marine conservation initiative

Far left: influential individuals can encourage broader behavior change

Left: launching a marine conservation initiative in West Papua through traditional cultural celebration

Over page: fishers of the future will benefit from behavior change in present times

In recent years, marine and fishery professionals from all sectors have become increasingly aware of the importance of behavior change, and a considerable number of communications initiatives regarding the marine and coastal environment have taken place at a range of scales (from multi-media campaigns to targeted local awareness-raising programs). These have been implemented by the government, NGOs, and civil society groups and have addressed a variety of marine-related issues. One NGO active in Indonesia (Rare) is solely dedicated to behavior change campaigns.

However, despite this advance, more work is needed overall in Indonesia to generate awareness, interest, enthusiasm, and willingness to change behaviors related to marine and coastal threats across all sectors of society – a challenge common amongst all nations.

The USAID SEA Project has recently undertaken extensive studies into local perceptions and attitudes towards marine and coastal issues in eastern Indonesia. The project has also identified a range of individuals as ‘Champions of the Sea’, i.e. key influencers in societies across the region. In the coming years, thorough campaigns will be implemented across this region to encourage changes in behavior in line with the sustainability goals of the FMA, with a target of at least 1,200 people exhibiting changes to behavior by 2021.

CTC / M WELLY



CHAPTER 6

BUILDING THE SKILLS NECESSARY FOR SUSTAINABILITY





To achieve all the management actions necessary for Indonesia to move towards a sustainable future, it is essential to ensure a skill base exists in the country that is capable of leading and implementing effective long-term change.

Skill building can be achieved through a range of mechanisms and can be targeted to provide advancement at a range of levels (basic, intermediary, and advanced). Learning methods range from ground-level learning-by-doing and on-the job training, to attending higher education establishments and earning academic degrees and diplomas, from participating in exchange visits or undertaking independent study online to attending international symposia and conferences.

At the academic end of the spectrum, advanced training courses related to marine, coastal, and fisheries management are available in 27 different universities and institutions across the country. In addition to this, both academic and ground-based practitioner training is supported by at least 17 major NGOs across the country, and a large number of smaller local agencies and civil society organization provide targeted and tailored skill-building support (ADB, 2011; ADB, 2014; Carter, 2014).

Left: fisherwoman with a catch of eel

ACADEMIC INSTITUTIONS PROVIDING MARINE, COASTAL AND/OR FISHERY RELATED COURSES IN INDONESIA

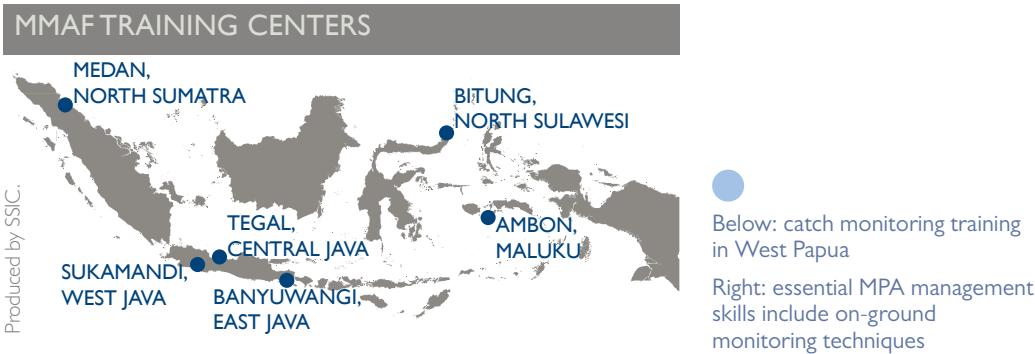
Akademi Perikanan Sorong (Papua Barat)	Universitas Mulawarman (Unmul – Kalsel)
Institut Pertanian Bogor (IPB – Bogor)	Universitas Muslim Indonesia (UMI – Makassar)
Sekolah Tinggi Ilmu Teknologi Kelautan (Kupang)	Universitas Negeri Gorontalo
Sekolah Tinggi Perikanan (STP – Jakarta)	Universitas Negeri Papua (Manokwari, Papua Barat)
Sekolah Tinggi Teknologi Kelautan Balik Diwa (STITEK Balik Diwa – Makassar)	Universitas Nuku (Tidore, Maluku Utara)
Universitas Andalas (Padang Sumatra Barat)	Universitas Nusa Cendana (Undana – Kupang)
Universitas Brawijaya (UB – Kota Malang)	Universitas Padjadjaran (Unpad – Bandung)
Universitas Bung Hatta (Padang, Sumatra Barat)	Universitas Pattimura (Unpatti – Ambon)
Universitas Diponegoro (Undip – Semarang)	Universitas Riau (Unri – Riau)
Universitas Halu Oleo (Unhalu – Kendari)	Universitas Sam Ratulangi (Unsrat – Manado)
Universitas Hasanuddin (Unhas – Makassar)	Universitas Satya Negara Indonesia (Jakarta Selatan)
Universitas Jenderal Soedirman (Unsoed – Purwokerto)	Universitas Syiah Kuala (Banda Aceh)
Universitas Khairun (Ternate)	Universitas Trunojoyo (Madura)
Universitas Lambung Mangkurat (ULM – Banjarmasin, Kalimantan Selatan)	Universitas Udayana (Unud – Denpasar)
Universitas Maritim Raja Ali Haji, Kep Riau	

KEY MARINE RELATED NGOs & ASSOCIATED AGENCIES PROVIDING CAPACITY BUILDING IN INDONESIA	
Conservation International (CI)	Starling Resources (SR)
Coral Reef Alliance	Sustainable Fisheries Partnership (SEP)
Coral Triangle Center (CTC)	The Nature Conservancy (TNC)
Coral Triangle Information and Learning Center	Wildlife Conservation Society (WCS)
Locally Managed Marine Area (LMMA) Network	World Wildlife Fund (WWF)
MantaWatch	Yayasan Alam Indonesia Lestari (LINI)
National Oceanic and Atmospheric Administration (NOAA)	Yayasan Terumbu Karang Indonesia (TERANGI)
Rare	Zoological Society of London (ZSL)
Reef Check Foundation Indonesia (RCI)	

Within the human resource department of the MMAF (BRSDM), training courses are also provided through six dedicated education nodes distributed across the country (in Ambon, Maluku; Banyuwangi, East Java; Bitung, North Sulawesi; Medan, North Sumatra; Sukamandi, West Java; and Tegal, Central Java).

The BRSDM is responsible for setting national work competency standards (*Standar Kompetensi Kerja Nasional Indonesia – SKKNI*) for all roles and tasks related to marine and coastal management. All personnel within the MMAF are expected to acquire the skill level identified for their respective roles.

To achieve the various marine and coastal sustainability goals of the nations, skill-building needs are required for all action frameworks. Within the MMAF, these needs particularly relate to building the skills for **effectively managing MPAs** as well as the skills necessary for **implementing EAFM** for sustainable fisheries management.



DEVELOPING NATIONAL WORK COMPETENCY STANDARDS (SKKNI)

Within a SKKNI, a range of competency units (*unit kompetensi*) are outlined that relevant staff are required to meet in order to perform their roles effectively. Each of these competency units provides more details on the elemental skills required for the roles, and for each of these elements performance criteria are provided for assessment.

Major steps to be taken in SKKNI development are as follows:

- (1) map existing competencies and those required to achieve work goals (including the qualification framework)
- (2) undertake a series of writing workshops to design, develop, and draft the preliminary SKKNI document
- (3) share the draft amongst relevant stakeholders, including practitioners, the government, academic representatives, NGOs, and, where relevant, industry representatives (pre-convention)
- (4) gain external verification of the SKKNI documents through the Ministry of Manpower
- (5) share to get final input / feedback / recommendations (convention)
- (6) draft a ministerial decree for approval
- (7) conduct a workshop to develop consensus among stakeholders on how best to implement the SKKNI.

Once a SKKNI is legalized by the Ministry of Manpower, further work is undertaken to provide supplementary academic documentation and identify which areas of skill building are mandatory and which are optional. This is then approved and formalized through a Minister of Marine Affairs and Fisheries decree.

WWF / S K SARI



BUILDING SKILLS TO EFFECTIVELY MANAGE MARINE PROTECTED AREAS

In 2012, the BRSDM worked with a team of invited experts from government departments and NGOs (known as Team Sebelas) to identify 14 core competency categories required for effective MPA management.

The team also identified the key staffing roles required in an MPA and the skills within each competency necessary for each staff role (ranging from basic to intermediate and advanced skills) (BPSPDM KP, 2012). These expectations were then formalized in scopes of work for all MPA personnel within the BRSDM (PerMen KP no. 9/2013).

Since this time, the BRSDM, university and academic partners, as well as NGOs and training organizations, have invested heavily in capacity building to support MPA staff to attain these skills. Learning networks have been established, and groups such as the Coral Triangle Center (CTC),

CORE MPA COMPETENCY CATEGORIES	
1	Management planning
2	Marine science
3	Community engagement
4	Public awareness and communication
5	Law and policy management within the MMAF
6	Monitoring, control, and surveillance (enforcement)
7	Operational area management
8	Information technology
9	Human resource management
10	Monitoring and management effectiveness assessment
11	Co-management
12	Administration and financial management
13	Resource utilization for economic activity
14	Institutional development

Conservation International (CI), the National Oceanic and the Atmospheric Administration (NOAA) (amongst others) have worked with the MMAF to design, develop, and certify training courses for personnel. To date, more than 160 different training courses specifically tailored towards these 14 competency categories have been available across the country (Carter, 2014).

However, given the vast scaling up of MPA establishment anticipated in the coming years – with a target of 30 million hectares of MPAs by 2030 – and the sheer number of personnel that will need ongoing capacity building in this area, these efforts require further investment, growth, and roll-out in order to meet the country’s extensive capacity support needs in the future.

Source: Carter, 2014



Left: participatory mapping at a natural resources management meeting in Maluku

BUILDING SKILLS FOR AN ECOSYSTEM-BASED APPROACH TO FISHERIES MANAGEMENT

Under Indonesian law, fishery education, training, and extension programs managed by the MMAF should meet international quality standards and are therefore frequently based on internationally recognized curricula models. With support from the USAID Indonesia Marine and Climate Support Project (IMACS) in recent years, the BRSDM produced guidelines for training development as well as standardized systems for undertaking training needs assessments across the country.

In 2014, the MMAF began mainstreaming EAFM into skill-building requirements. This included the development of a special work competency standard (*Standar Kompetensi Kerja Khusus – SK3*) for EAFM. In 2016, after a series of discussions, the MMAF decided to upgrade this SK3 into a full SKKNI to ensure EAFM training models meet a sufficiently high standard. This process is currently underway and is supported by the USAID SEA Project.

In 2017, the Directorate General for Capture Fisheries under the MMAF further issued a decree to establish EAFM learning centers to support capacity building across the country (decree no. 49/2017). At the time of writing, these centers are in the process of being established and will provide academic input to the scientific units of each FMA fisheries management council. To this end, the centers are established within designated universities located in each FMC.

The USAID SEA Project is supporting skill building in a range of areas at the national level. To date, this has included capacity building for marine spatial planning processes, training on stock assessments, harvest strategies, and data management, as well as skill building on assessing communities' perception of marine conservation management. For enforcement support at the national level, the USAID SEA Project has provided capacity-building support for implementing port state measures, as well as technical trainings on the use and adaptation of VIIRS surveillance technology. In the coming years, these efforts will continue at the national level, but emphasis will be placed on advancing skills in the effective management of MPAs and EAFM for sustainable fisheries.

Below: marine rapid assessment with mini-purse seine fishermen in North Maluku

Over page: schooling sweetlips on vibrant coral reef in eastern Indonesia



CTC / M KOREBIMA



CHAPTER 7

LOOKING AHEAD



This book has provided a snapshot of the **state of the sea** in Indonesia. It has shown how this largest archipelagic nation in the world hosts the greatest marine biodiversity to be found anywhere on earth. The heart of the underwater world is located here, driving marine life production for the Coral Triangle Region of Southeast Asia and the Pacific and providing a critical life support system for the planet. The rich marine ecosystems, resources and coastal areas of Indonesia provide food and livelihood to millions of Indonesians and thus the impetus to manage and sustain these resources is growing as people across the archipelago realize the values of what they might lose.

We have also learned that the coastal and marine resources of Indonesia are under threat. Slowly, gradually, they are being depleted and degraded. And the causes of this loss lie firmly in the hands of one species – *Homo sapiens*. For centuries, people have been wantonly exploiting the seas for food, for building materials, for pharmaceuticals, and for pleasure. The cumulative impact is now being felt, and the system can no longer handle the onslaught of threats it faces.

But there is hope. Today, there is a greater recognition than ever before of the damage we are wreaking on this fragile ecosystem. There are movements underway to turn back the tide of destruction. To restore balance. To change the ways in which we use the resources the ocean has to offer. To respect the seas and live sustainably, so the marine environment may continue to support the people of today as well as future generations.

This volume has outlined, in brief, the myriad of efforts currently underway to try and bring about sustainable change. It has shown how Indonesia is, in many ways, at the forefront of change efforts globally, setting a path and learning lessons that many other nations may benefit from as they too try to restore balance to their oceans and its resources. The Government of Indonesia with a large array of partners is supporting improved policies for management at national and local levels, trying to empower local governments to build capacity, and encouraging partnerships with the private sector (among other strategies) to build sustainable use and management systems.



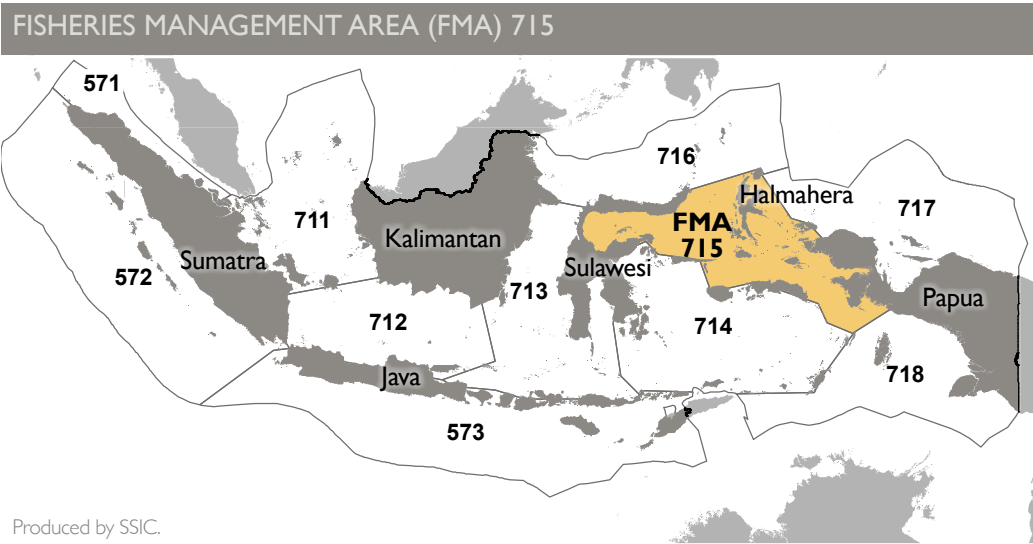
Left: fisherman with catch of tuna
Below: aerial view of healthy fringing reef in eastern Indonesia
Over page: view out to sea in Maluku



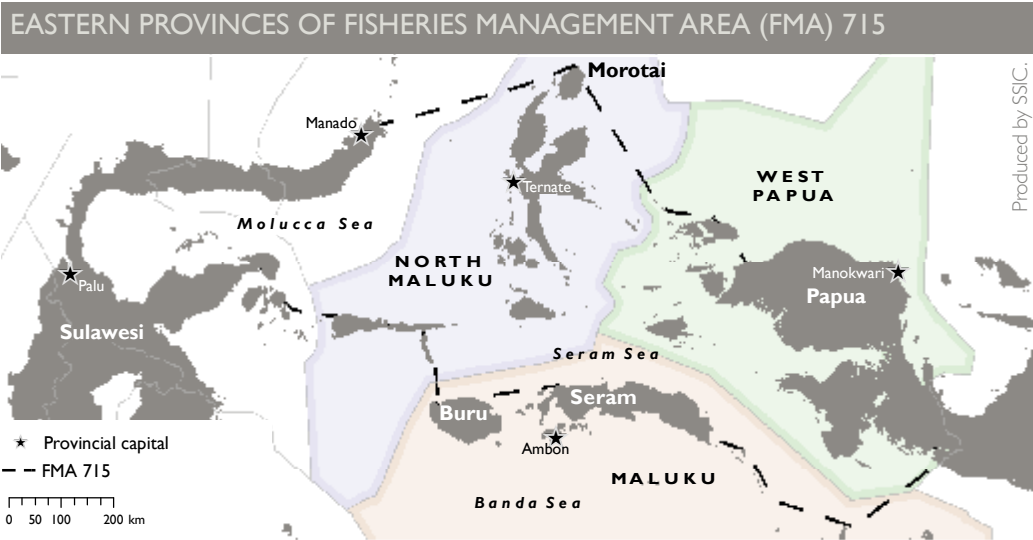
T SCHULTZ

In the next book of this State of the Sea publication – **Volume Two** – we deep dive into eastern Indonesia, to the fisheries management area number 715. This region has been selected as a priority for Indonesia due to its exceptional marine biodiversity and high levels of endemism (species that are unique to that area). It is also an economically poor region of Indonesia, with coastal populations that are highly dependent on the marine environment and its resources.

Volume two provides an overview of the status of the area, the place, the people, the fisheries, and key threats the region faces. It takes you to the eastern provinces of the FMA – North Maluku, Maluku, and West Papua – and reveals in more detail the technical work required to make the vision of sustainability promulgated by the government become a reality.



In the third and final book in this State of the Sea publication – **Volume Three** – we take a journey through the three eastern provinces of North Maluku, Maluku, and West Papua. We visit the sites, explore the marine environments, meet the people, and discover the on-ground efforts to achieve sustainability in this region, with support from the USAID SEA Project. The experiences currently unfolding in this region will inform, inspire, and guide implementation efforts that may be replicated across the nation.





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